



## On the Role Played by Project-Based Learning in Teacher Training Online

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### Article History

Received: 24 June, 2021

Revised: 17 July, 2021

Accepted: 25 July, 2021

Published: 29 July, 2021

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### Abstract

This work investigates the perceptions on the role played by Project-Based Learning (PBL) in English as a second language (L2 English) participants who are receiving teacher training online. The participants in this study were enrolled in the Psycholinguistic Analysis of English Acquisition module at xxx-removed for blind review. They were given the choice of two projects: (a) an L2 English learner linguistic profile and (b) a grammatical structure analysis and its L2 English teaching application. The participants' opinions about PBL were then collected in a questionnaire that included the following variables: motivation and attitude towards L2 English learning before and after the project, perception of the development of English language proficiency skills, content acquisition, and other issues related to PBL such as L2 learning reflection; and, autonomy and real language use. They reported having learned by doing and, as a consequence, believed that they had learned autonomously because they were responsible for their own learning. Likewise, they claimed PBL facilitated critical thinking, creativity, language awareness, and professional development through the project completion. They also showed a positive attitude towards the integration of the four language skills and the building of content knowledge by gathering and planning information using authentic resources.

**Keywords:** Project-based learning; English acquisition; Perception; Language proficiency; Content knowledge; Teacher training.

## 1. Introduction

English language teaching and learning methods have changed drastically (Fletcher, 2005; Poonpon, 2011; Simpson, 2011) and are now much more focused on meeting the learning needs of students. Teaching methods need to cater for a wide range of learners' proficiency levels as well as teaching and learning settings; both factors will have a great impact on learning results. For instance, settings where the population has a positive attitude towards English language learning will contribute to positive learning outcomes when compared to settings in which negative views towards English language learning prevail. The present study focuses on the implementation of one type of teaching method, the project-based learning (PBL) approach, in order to examine its effectiveness (or lack thereof) to help trainee teachers increase language awareness in assessing L2 English learners' output.

Learning by doing (Dewey, 1938; Reese, 2011) is one of the principles that characterizes PBL teaching methods. Through this approach, while students focus on active learning and take responsibility for their own learning, teachers provide students with multi-tasked orientations. The aim of PBL is to help students lead their own learning process (Chayanuvat, 2007; Fried-Booth, 2002; Levine, 2004; Zhou and Kolmos, 2013). When designing and completing projects, students face new challenges in a society that is in constant change and teachers become their companions in the learning journey by facilitating critical thinking skills, strengthening students' talents and allowing them to learn by doing.

Teaching roles in both secondary and tertiary education roles include (a) making instructional decisions and formulating academic and social skills (b) explaining the instructional task; (c) monitoring and assessing students' learning and (d) helping students in the project design (Fried-Booth, 2002; Gillies, 2007; Gillies *et al.*, 2008).

Nowadays, PBL is common practice in L2 English teaching and learning (Renandya and Puji, 2016; Srikrai, 2008). Earlier studies have mainly focused on investigating the effectiveness of PBL in general English learning by examining undergraduate L2 English students (Gülbahar and Tinmaz, 2006; Poonpon, 2011; Stobaugh, 2013), youngsters (Praba *et al.*, 2018) and children (Kimesiz *et al.*, 2017). We aim to fill the gap in tertiary education research by assessing trainee teachers' masters students' perceptions on the role played by PBL in the process of L2 English learning for specific purposes following the xxx-removed for blind review methodology. This methodology involves the participants of this study learning the module contents through an educational online platform for self-learning at their own pace. The virtual platform enables teachers and students to interact and communicate in English via, for example, forums, online videoconferences, chat, and online exams, therefore, promoting students' collaborative work. Through the implementation of a questionnaire for students enrolled in the module

psycholinguistic analysis of English acquisition in the masters program of teacher training in compulsory secondary education and A-levels, professional training and language learning at *xxx-removed for blind review*, we examine adult learners' perceptions to their attitudes and motivation towards second language (L2) English learning before and after completing a written project. More specifically, this questionnaire allows the participants to assess and reflect on the PBL pedagogical purposes and optimal implementation (or lack thereof) in an L2 English classroom. It also explores their opinions regarding the development of English language proficiency skills (vocabulary, grammar, speaking, listening and writing), content learning of the topics addressed in the module and other perceived benefits of PBL such as language learning reflection, L2 use and creativity, and learning autonomy and confidence. The participants' language competence in L2 English is advanced or C2 level, according to the common European framework of reference for languages (Council of Europe, 2001).

Two projects designed to analyze the process of L2 English acquisition from a pedagogical approach were proposed for this study and the participants were asked to complete one of them. The first project focused on recording an intermediate+ L2 English learner's spontaneous speech via interviews in order to examine their language output from a linguistic approach. In particular, this project aimed to identify the non-native speaker's syntactic, lexical and semantic errors in their oral fluency. The L2 English learners were required to be older than thirteen years old so as to engage in English conversation. The second project addressed the analysis of the grammatical properties of an English complex structure (for instance, for and passive) and its teaching application in an L2 English classroom. These two projects set the basis for training future L2 English teachers in raising awareness of language structures and grammar used in the learners' output. Furthermore, they also served as a pedagogical aid in the implementation of PBL methodology in the classroom in order to enhance learners' creative, reflexive and autonomous skills in the process of learning L2 English. The development of a conscious knowledge about the didactic use of PBL in L2 English learning via an opinion questionnaire will encourage teachers to facilitate their students' learning outcomes.

This work is organized as follows: section 2 discusses the properties that characterize PBL; section 3 reviews earlier L2 English empirical works on PBL; section 4 presents the methodology and involves the formulation of the research questions (RQs) that will guide the data analysis (section 4.1) and the participants (section 4.2) as well as the instruments and procedures that have been implemented in the study (section 4.3); section 5 offers the data analysis; section 6 presents a discussion of the findings; and section 7 draws conclusions and suggests areas for further work.

## 2. Project-Based Learning in the Context of L2 English Learning

PBL is an inquiry-based, constructivist and student-centred teaching approach that organizes learning based on projects; thus, L2 English students are involved in learner-centred settings that enhance the development of certain skills (Lee, 2018). This is achieved through complex tasks that could be focused on, for example, solving real-world problems, making decisions and planning or searching for and analyzing information (Fried-Booth, 2002; Levine, 2004; Pham, 2018).

Through the completion of meaningful and purposeful tasks, PBL encourages learners to develop an interest in L2 English learning and to understand the content of topics where English is the medium of instruction (Dagar and Yadav, 2016; Ghaffoor, 2018; Loyens *et al.*, 2007; Renandya and Puji, 2016; Srikrishna, 2008). Therefore, PBL enhances motivation in learning, develops creativity and critical thinking skills and fosters learning autonomy. It also gives L2 English students the chance to build topic knowledge through project design based on their interests, individual differences and prior knowledge applied to meaningful settings (Chayanuvat, 2007; Pham, 2018; Vygotsky, 1978; Wrigley, 1998).

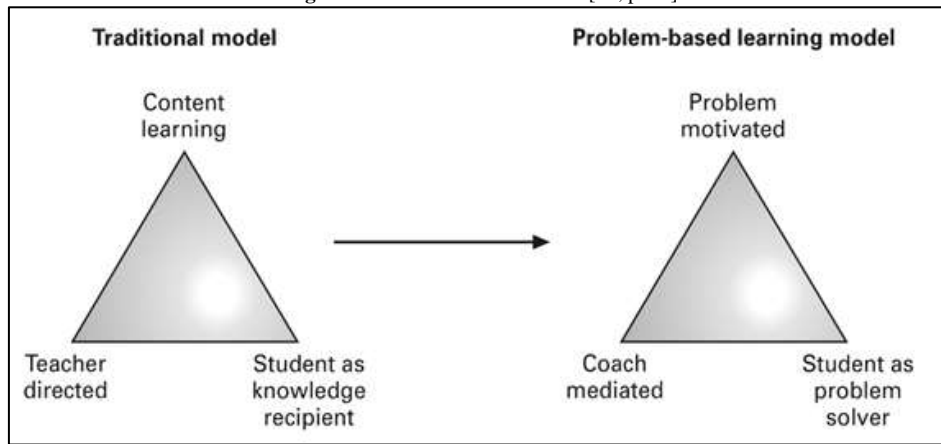
Furthermore, PBL tasks seek to integrate the L2 English students' four language skills and target an agreed objective that involves planning and collecting information by means of reading and listening, observation, group discussions, and the completion of problem-solving tasks along with the design of oral and written reports (Pham, 2018; Srikrishna, 2008; Wrigley, 1998).

L2 English students are responsible for planning the collection and examination of information from a wide range of sources and for executing the project. This implies active involvement in the task set and fosters independent thinking, self-confidence and social responsibility (Dewey, 1938; Tan and Ee, 2004; Tan, 2004a; 2004b). In other words, PBL focuses on autonomy, along with collaborative and student-centred learning (Levine, 2004; Pham, 2018).

In this type of projects, L2 English students work in pairs, in groups or individually and they usually generate tangible outcomes that are shared with peers, teachers and families (Gillies, 2007; Gillies *et al.*, 2008; Zhou and Kolmos, 2013). In order to design a project, therefore, different elements are taken into account: (a) a motivating, achievable and interdisciplinary topic that supports the core curriculum; and (b) specific objectives presented as open questions that allow students to think and reflect on the topic (Levine, 2004; Pham, 2018; Tan and Ee, 2004; Tan, 2004a; 2004b).

As discussed earlier and in line with the study conducted in this paper (see section 4), a possible type of PBL within the inquiry-based instruction approach is the development of purposeful and meaningful problem-solving tasks. This implies a student-centred focus in which learners make use of multiple ways of knowing, learning and real language use in the project development. Following the Tan (2003) curriculum-shift model depicted in Fig. 1, L2 English students are given a real-life hypothetical problem where they begin a process of investigation that targets finding solutions and developing creative and critical thinking skills.

Fig-1. A model of curriculum shift [26, p. 12]



Following (Tan, 2003), “problems can engage curiosity, inquiry and thinking in meaningful and powerful ways and education frameworks need a new perspective of searching for problems and looking at problems” (p. 12). In this way, L2 English students show a positive attitude towards learning and passive transference of information processing is removed.

In PBL, the learning task is defined as a motivating and authentic task. According to Stobaugh (2013), authentic tasks revolve around student-centred approaches for which L2 English students target the development of certain skills and gain knowledge by experiencing problem-solving tasks. Teachers assess both the process and the final product and encourage the integration of the four language skills in the project by focusing on the students’ L2 use (namely, English) for communicative purposes and meaning-focused real-world contents (Levine, 2004; Poonpon, 2011; Wrigley, 1998).

### 3. Empirical L2 English Learning Works on Project-Based Learning

A great number of studies has investigated the role played by PBL in L2 English learning from two main perspectives (Gülbahar and Tinmaz, 2006; Kimsesiz *et al.*, 2017; Poonpon, 2011; Praba *et al.*, 2018; Simpson, 2011; Supe and Aivars, 2015). On the one hand, there are studies that have measured the effects of PBL on students’ learning of L2 English language proficiency skills, namely, the four language skills in adults (Fried-Booth, 2002) or cross-cutting skills such as vocabulary in pre-school children (Kimsesiz *et al.*, 2017) and writing skills in 14-to-15 year old youngsters (Praba *et al.*, 2018). On the other hand, there are also works that have gauged L2 English students’ perceptions about the effectiveness of PBL in 12-to-15-year-old youngsters (Stobaugh, 2013) and in undergraduate learners (Gülbahar and Tinmaz, 2006; Poonpon, 2011).

Simpson (2011), examined whether PBL was able to enhance students’ L2 English language proficiency skills, learning abilities and self-confidence in an English for Tourism course. While students did not develop their listening and reading ability, they did reflect improvement in their speaking and writing skills. The results also showed enhancement of their learning skills (group work, order thinking and presentation abilities) and self-confidence.

Kimsesiz *et al.* (2017), studied the effect of PBL on L2 English teaching vocabulary in L1 Turkish pre-school children. Twenty-eight children (age range: 5-6 years old) were allocated to two groups: an experimental group (six boys and eight girls) which received PBL instruction and a control group (eight boys and six girls) which received traditional instruction for 8 weeks. In the experimental group, the teacher introduced vocabulary related to the topic through pictures or real objects, and asked participants to suggest content and final project design to be completed in groups. In the control group, traditional instruction was implemented through coursebooks, songs, games or flashcards. The findings revealed that PBL (a) was not commonly used in L2 English classes in Turkey; and (b) increased L2 English lexicon knowledge when compared to traditional teaching methods, as measured by test scores and exam performance ( $F(1,26) = 406.591, p = .000$ ). Furthermore, the data showed that pre-school children were more active in PBL lessons when compared to the control group ( $t(26) = 13.43, p = .000$ ).

Praba *et al.* (2018), explored the effect of PBL on L2 English students’ writing skills (age range: 14-15 years old) based on a guided interview, observation and a writing test. The findings indicated that PBL (a) played a positive role in the participants’ English writing skills; and (b) contributed to developing critical thinking, interactive communication and creativity via collaborative learning. With regards to (a), a pre-test and post-test were performed, the results showing an improvement in the participants’ writing post-test when compared to the pre-test ( $t(31) = 11.980, p = .000$ ).

Further works have analyzed the participants’ perceptions of PBL. For instance, Stobaugh (2013) investigated PBL effectiveness in L2 English learning through an opinion poll conducted on one-hundred-and-nine L2 English students (age range: 12-15 years old). The students showed motivation and a positive attitude when learning English before the implementation of PBL, but such behavior actually increased after the implementation of PBL. Although 52% of students considered that projects were an effective learning method before they experienced PBL, 82% reported that their positive attitude towards studying through projects increased after the experiment.

Supé and Aivars (2015), also reported that 53% of the L2 English learners preferred projects to ordinary English lessons (20%) before the experiment. These frequency rates increased after the experiment for both project work (86%) and the attitudes for ordinary lesson decreased (6%) after the experiment.

In the case of tertiary education, Poonpon (2011) investigated forty-seven undergraduate L2 English learners' opinions about the effectiveness of PBL in the integration of the four language skills in university language classrooms in Thailand. The participants were enrolled on an English Information Science course and were asked to work collaboratively to carry out an interdisciplinary-based project while practicing and integrating the four English skills, using authentic materials from different offline media. The students were asked to work in groups to design a presentation on the role of Information Science in our society. Qualitative data were collected by means of semi-structured interviews. Results showed that students considered that PBL balanced language and content use and promoted the development of the four language skills as well as lexical knowledge when gathering, selecting, analyzing and synthesizing information from a wide range of sources.

Gülbahar and Tinmaz (2006), explored eight undergraduate students' perceptions about PBL via semi-structured interviews by implementing e-portfolio evaluation. These students followed the Design, Development and Evaluation of Educational Software fourteen-week course which was designed in a way that learners could build upon their own knowledge. The e-portfolio included written reports, multimedia presentations, statistical analyses and two software programs. There were sixteen Likert-scale based questions (1 = strong disagreement; 5 = strong agreement) that revolved around the challenges encountered in the project design. After the course, the learners submitted their projects and e-portfolios. And the results demonstrated that PBL was an adequate method for conducting the course and evaluating e-portfolios and one that benefitted student-centred learning regarding the software development process. This was reflected in the mean value of responses (between 4.14 and 4.57) showing a high degree of learners' satisfaction with the course and the teacher. In turn, learners agreed that PBL led to successful results in their academic performance.

The following sections discuss a case study of L2 English students' satisfaction in the implementation of a PBL method in tertiary education.

## 4. Project Method in Online Teaching Training: A Case Study

### 4.1. Research Questions

Considering earlier formal accounts (section 2) and empirical works (section 3) on the role played by PBL in L2 English learning, three RQs have been formulated.

- RQ 1. What are trainee teachers' Masters students' motivational attitudes towards L2 English learning through PBL, as measured by a perception questionnaire?

Based on RQ 1, we predict that positive attitudes will be shown towards L2 English learning through PBL, in line with previous empirical research in the field (Supé and Aivars, 2015). These answers will be triggered by the properties that characterize this teaching methodology, namely, it allows development of (a) autonomy as they are responsible for their own learning; (b) real language use; (c) capacity to monitor the learning process and the final project design; (d) skills to read, gather and select information; and (d) abilities to find solutions for problem-solving tasks (Pham, 2018; Poonpon, 2011; Simpson, 2011; Tan, 2004a; 2004b).

- RQ 2. What are trainee teachers' Masters students' opinions on the development of L2 English proficiency skills (lexicon, grammar, writing, speaking and listening) through PBL, as examined by a perception questionnaire?

In view of the findings reported in previous research, we predict that trainee teachers' Masters students will consider PBL as an approach that enables the improvement of their English language proficiency skills. These data are expected to be equally reflected in the responses concerning the integration of the four language skills, as well as the development of grammar and lexical array via the completion of a number of written or oral tasks (Levine, 2004; Srikrai, 2008; Supé and Aivars, 2015).

- RQ 3. What are trainee teachers' Masters students' perceptions on the acquisition of content knowledge when Psycholinguistic Analysis of English Acquisition is the main topic addressed in the completion of PBL, as tested by an opinion questionnaire?

Based on RQ 3, we predict that trainee teachers' Masters students will believe that PBL increases their knowledge on Psycholinguistic Analysis of English Acquisition, as per previous related empirical works (Kimsesiz *et al.*, 2017; Wrigley, 1998). These responses will be motivated by the students' reading of authentic resources proposed for the module that, in turn, will be reflected in the final written project design. If these findings are on the right track, PBL will play a crucial role in the students' learning content and in using L2 English for a purposeful goal-setting (Gülbahar and Tinmaz, 2006; Simpson, 2011; Srikrai, 2008).

### 4.2. Context and Participants

Fifty-nine trainee teachers were tested; forty-eight women (81.4%) and eleven men (18.6%). Their ages ranged between (a) 20-30 years old (thirty-one participants, 52.5%); (b) 31-40 years old (nineteen participants, 32.2%); (c) 41-50 years old (eight participants, 13.6%); (d) 51-60 years old (none) and (e) over 61 years old (one participant, 1.7%).

All the trainee teachers were enrolled in the module Psycholinguistic Analysis of English Acquisition in the online Masters Program of Teacher Training in Compulsory Secondary Education and A-Levels, Professional Training and Language Learning at *xxx-removed for blind review*. The course topics were based on Lightbown and

Spada (2013) and they were tailored to individual differences in L2 learning, these being L2 classroom learning through the use of English as the means of written communication, language learning in early childhood, learner language, and L2 classroom teaching and learning observation. All of them had an advanced proficiency level in L2 English which was a requirement before enrolling on this module.

There was a wide range in the trainee teachers' first language (L1), namely, Basque (one participant, 1.7%), Catalan (three participants, 5.1%), English (one participant, 1.7%), Romanian (one participant, 1.7%), Russian (four participants, 6.8%) and Spanish (forty-three participants, 72.9%). There were three groups of simultaneous bilingual (2L1) speakers, namely, Catalan-Spanish (three participants, 5.0%), Galician-Spanish (two participants, 3.4%) and Spanish-Italian (one participant, 1.7%).

### 4.3. Instrument and Procedures

The fifty-nine trainee teachers were asked to complete a final written project individually to demonstrate the applicability of the different linguistic proposals in the teaching and learning practice of English as an L2, as discussed in Lightbown and Spada (2013).

The PBL proposal followed the distance methodology of *xxx-removed for blind review* (see section 1) Where they were asked to read the required coursebook before carrying out the final project. The two professors in charge of the module solved the trainee teachers' doubts about the development of their projects in the forum designed for that purpose. English was the medium of instruction of the course.

As in Appendix I, two projects were proposed, and they were asked to complete one of them at home. Both projects ranged from five-thousand words (minimum) to ten-thousand words (maximum). Instructions were uploaded to the virtual course platform designed for the distance learning methodology at *xxx-removed for blind review*. The two projects that set the basis to collect the data in this study were taken from *Course Syllabus ESU 561 Aspects of the English Language*, taught by Dr. Bart Weyand at the University of Southern Maine. Permission to use the project instructions has been granted by the author.

The first project was designed for trainee teachers to conduct an extensive audio-recorded interview with a non-native speaker of English. The project instructions recommended interviewing a speaker at a higher intermediate+ level, following the Common Framework of Reference for Languages CFRL (Council of Europe, 2001) so as to engage in a more open-ended discussion. The speaker was required to be over 13 years old. The participants could formulate any questions to the interviewee so as to trigger L2 English spoken output with the aim of examining the speaker's L2 from a morphological, syntactic and semantic approach. This morpho-syntactic and semantic analysis will account for L1 interference in the L2 English interviewee's output. From a morphological viewpoint, participants had to describe the use of word classes and inflectional or derivational morphemes. Examples of syntactic analyses include grammatical errors and ungrammatical sentence or tense/aspect patterns, the use of articles, gerunds and infinitive verbs, modal verbs and direct and indirect questions. A semantic analysis of how the non-native speaker uses words and sentence structures to convey meaning was also examined. Participants were also asked to provide an interviewee's writing sample for use it as part of the L2 analysis.

The second project asked trainee teachers to explain the grammatical rules and conditions of an English grammatical structure (for instance, passive) and present potential problem areas for L2 English students in one particular linguistic domain. Linguistic domains could include L1 interference, semantic understanding, syntactic formation, pragmatics or pronunciation. The participants of this study could use grammar books to lend support to their arguments in the project design. Once the grammatical phenomenon was explained, the participants were asked to assess the L2 English learning of that grammatical structure inductively in a classroom context.

After submission of the two projects, they were asked to complete a questionnaire via Google forms that assessed their opinions about the effectiveness of PBL in their learning. In particular, the questionnaire gauged the degree of satisfaction regarding their attitude and motivation towards L2 English learning before and after completing the project, language proficiency development of L2 English skills, content knowledge and other issues related to the PBL approach. The design of the questionnaire is summarized in Table 1.

Table-1. Questionnaire design

| Variables   | Questions   | Type of answers                  |
|---|---|----------------------------------|
| Attitude and motivation towards L2 English learning through PBL | Before the project:<br><i>Did you feel motivated and enjoy learning English before completing the project?</i>  | Quantitative<br>(1= yes; 2 = no) |
|   | After the project:<br><i>Did you feel motivated and enjoy learning English after completing the project?</i>  |                                  |
| Language proficiency in PBL                                     | Ways of learning English while completing the project:<br><i>How did you learn English while completing the project?</i>                                    | Qualitative<br>(free answer)     |
|   | Perception of English lexical improvement after the project:<br><i>Do you think you have improved your English vocabulary after completing the project?</i> | Quantitative<br>(1= yes; 2 = no) |
|   | Perception of English grammar improvement   | Quantitative                     |

|   |  |   |
|---|--|---|
|   | after the project:<br><i>Do you think you have improved your English grammar after completing the project?</i>   | (1= yes; 2 = no)  |
|   | Perception of English writing skills improvement after the project:<br><i>Do you think you have improved your English written skills after completing the project?</i>                               | Quantitative<br>(1= yes; 2 = no)  |
|   | Perception of English speaking and listening skills improvement after the project:<br><i>Do you think you have improved your English speaking and listening skills after completing the project?</i> | Quantitative<br>(1= yes; 2 = no)  |
|   | Reasons for perceiving lack of English improvement:<br><i>If you think you have not improved your English after completing the project, say why</i>  | Qualitative<br>(free answer)  |
|   | Challenges encountered when completing the project:<br><i>What are the main challenges/difficulties encountered that you would highlight when completing the project?</i>                            | Qualitative<br>(free answer)  |
| Content acquisition   | Perception of the module content improvement:<br><i>Do you think you have improved the project-oriented content after completing the project?</i>  | Quantitative<br>(1= yes; 2 = no)  |
|   | If the perception is positive:<br><i>If your answer is yes, say how</i>  | Qualitative<br>(free answer)  |
|   | If the perception is negative:<br><i>If your answer is no, say how</i>   |   |
| Degree of satisfaction with other PBL variables:<br>Assess from 1 ('poor') to 5 ('excellent') how the project has helped with the following factors | <i>Language learning reflection</i>  | Quantitative<br>(1 = poor; 2= fair; 3 = good; 4 = very good; 5 = excellent) |
|   | <i>Real/authentic language use (opportunities for language interaction and language communication)</i>   |   |
|   | <i>Learning autonomy</i>   |   |
|   | <i>Language creativity</i>   |   |
|   | <i>Learning confidence</i>   |   |
|   | <i>Deeper understanding of the topic</i>   |   |

The questionnaire has considered four variables, namely, the trainee teachers' perceptions of (a) attitude and motivation towards L2 English learning before and after completing one of the two projects; (b) language proficiency skills acquired after completing the project; (c) acquisition of the content taught in the module they were enrolled in; and (d) other issues regarding the PBL implementation (for example, L2 learning reflection).

Each target question is analyzed by using a dichotomous yes-no question scale and a Likert scale (from 1 (poor) to 5 (excellent)), depending on the objective of the question formulated in each item. The dichotomous yes-no question scale was used to measure the perception on attitude and motivation towards L2 English learning before and after the project submission, the development of language proficiency skills and the module content acquisition through PBL. The Likert scale assessed other factors related to PBL, as listed in Table 1. Open questions were added in each of the variables under analysis for obtaining some qualitative data via free responses.

## 5. Data Analysis

This section presents an analysis of the data collected in the questionnaire from a quantitative approach (section 5.1) and from a qualitative perspective (section 5.2).

### 5.1. Quantitative Data

There are no significant differences between the trainee teachers' opinions regarding their attitude and motivation towards L2 English learning before they completed the project and after the project submission, as statistically evidenced by Fisher's exact test ( $p = 0.052$ ). Out of the fifty-nine trainee teachers, fifty-four reported positive attitudes towards English learning before and after the project (91.5%), and five gave a negative answer (8.5%).

They were also asked whether they felt that the project had improved their L2 English proficiency skills (as measured in terms of grammar, lexicon, speaking and listening skills, and written production), and whether they believed that PBL enhanced the content knowledge of issues related to Psycholinguistic Analysis of English Acquisition. An Exploratory Factor Analysis (EFA) was run to elucidate the underlying patterns of the previously discussed set of language proficiency variables as well as the content variable measured in terms of a battery of dichotomous yes-no questions. We (a) calculated a tetrachoric correlation matrix, which is the polychoric matrix for dichotomous variables (yes/no responses) and (b) implemented the EFA with the “fa()” function of the psych statistical package in R for the analysis of two factors. With regards to (b), given the number of measured variables under investigation, we explored the four language proficiency variables and the content variable in terms of two factors, namely, lexico-linguistic factors and content factor. Each of these factors was grouped in this way given that certain variables under investigation showed high analogous patterns or standardized loadings, as summarized in [Table 2](#).

**Table-2.** Standardized loadings (pattern matrix) of language proficiency and content variables based upon correlation matrix

| Variables or factors   | Factor 1: Lexico-linguistic | Factor 2: Content |
|------------------------|-----------------------------|-------------------|
| Lexicon                | 0.93                        | 0.00              |
| Grammar                | 0.79                        | -0.16             |
| Speaking and listening | 0.57                        | 0.63              |
| Written production     | 0.89                        | 0.39              |
| Module content         | -0.15                       | 0.99              |

Three variables showed an analogous pattern or similar loadings in Factor 1, namely, lexicon (0.93), grammar (0.79) and written production (0.89). The other variables in Factor 1 (that is, speaking and listening skills (0.57) and the knowledge of the module content (-0.15)) did not reveal high loadings, which suggests that they did not exhibit a similar pattern when compared to that of the lexico-linguistic variables in Factor 1.

The variable or factor tagged as content presented the highest standardized loading in Factor 2 (i.e. 0.99) when compared to lexicon (0.00), grammar (-0.16), written production (0.39) along with speaking and listening skills (0.63). Therefore, the variable content showed an isolated pattern when compared to the lexico-linguistic factor.

There was one variable (speaking and listening) that was assessed equally in the lexico-linguistic variables (Factor 1) and the content variable (Factor 2) since it presented a similar standardized loading in the two patterns (0.57 in Factor 1; 0.63 in Factor 2). These data implied that speaking and listening skills could be grouped in each of the two factors under investigation in the project design.

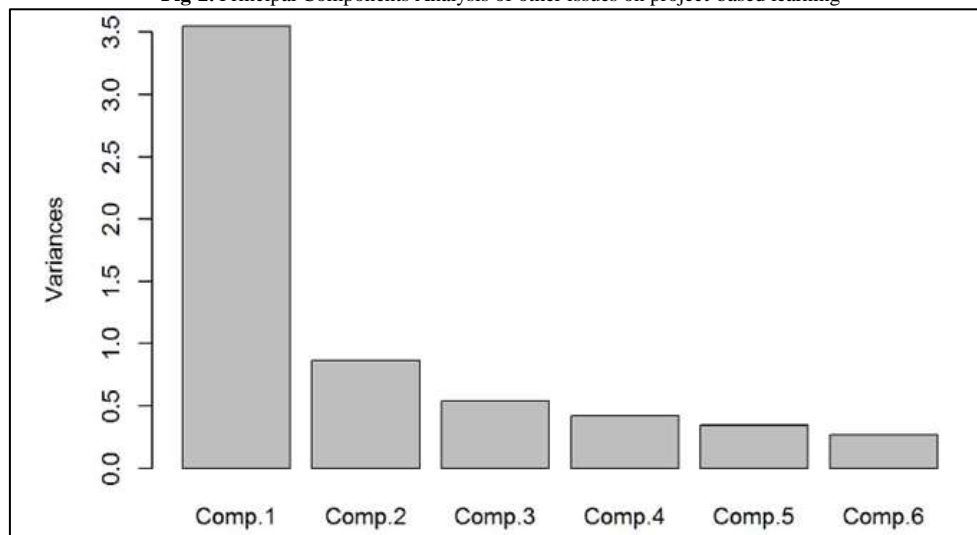
For other project-related questions, trainee teachers were asked whether they thought the project boosted (a) learning reflection; (b) L2 authentic use; (c) learning autonomy; (d) creativity; (e) self-confidence and (f) deeper understanding of the project content. A mean score of each of these variables under analysis is depicted in [Table 3](#). Based on the findings obtained from a Likert scale that ranges from 1 (poor quality) to 5 (excellent quality), the mean scores ranged from 3.6 to 4.1. These data show that the trainee teachers considered that PBL encouraged reflection on the process of learning, using English language as a means of instruction and for specific purposes, learning by doing, being creative and confident in the project design and acquiring a deeper knowledge on the topic proposed in each of the two projects.

**Table-3.** Mean scores on the trainee teachers' perceptions regarding other project-related questions

| Variables                                 | Mean scores (Likert scale) |
|---|----------------------------|
| Learning reflection                       | 4.0                        |
| L2 authentic use                          | 3.8                        |
| Learning autonomy                         | 4.0                        |
| Creativity                                | 3.6                        |
| Self-confidence                           | 3.8                        |
| Deeper understanding of the project topic | 4.1                        |

In addition, an EFA was implemented to examine whether there was a correlation among the six target variables illustrated in [Table 3](#). Before implementing the EFA, we needed to consider how many factors we could predict that might potentially be extracted. As depicted in [Fig. 2](#), we obtained these data by implementing a Principal Components Analysis (PCA) to the sample, that is to say, to the six above-mentioned variables that were associated with other issues on the project. Results showed that the trainee teachers seemed to consider other issues related to PBL to be explained by two main components (comp.), namely, language reflection (comp. 1) and L2 real use (comp. 2) given that, as will be detailed in [Table 3](#), these were the components that showed the highest proportion of variance. However, language reflection was the component that seemed to account for other issues related to PBL when completing the proposed project, as shown by the significantly high proportion of variance when compared to the other variables or components under analysis.

Fig-2. Principal Components Analysis of other issues on project-based learning



Comp. 1 = Language reflection  
 Comp. 2 = L2 authentic use  
 Comp. 3 = Learning autonomy  
 Comp. 4 = Self-confidence  
 Comp. 5 = Deeper understanding of the content

Based on the PCA illustrated above, the proportion of the variance that was explained by these components is summarized in Table 4.

Table-4. Proportion of variance per component

| Comp. 1:<br>L2<br>reflection | Comp. 2:<br>L2<br>authentic<br>use | Comp. 3:<br>Learning<br>autonomy | Comp. 4:<br>Creativity | Comp. 5:<br>Self-<br>confidence | Comp. 6:<br>Deeper understanding of<br>the content |
|------------------------------|------------------------------------|----------------------------------|------------------------|---------------------------------|--|
| 0.5915418                    | 0.1447729                          | 0.09009136                       | 0.07079282             | 0.0579933                       | 0.04480789   |

The first component (that is, L2 reflection) showed almost 60% of the variance explained (0.59). The second component (i.e. L2 authentic use) incorporated 14% (0.14) of the variance. These two components explained 75% of the total proportion of the variance (0.73). The other components did not reflect a significant proportion of variance, which meant that the other issues that were related to projects could not be explained by components such as learning autonomy, creativity, self-confidence and deeper understanding of the topic.

In view of the proportion of variance of other related-project issues per component, an EFA was implemented by grouping the six components discussed earlier into two main factors, as shown in Table 5 below.

Table-5. Loadings per component regarding other issues related to project-based learning grouped into two factors

| Component<br>(variable)                | Factor 1:<br>non-linguistic skills | Factor 2:<br>(psycho)linguistic and cognitive skills |
|--|------------------------------------|--|
| L2 reflection                          | 0.266                              | 0.698  |
| L2 use                                 | 0.274                              | 0.797  |
| Learning autonomy                      | 0.607                              | 0.422  |
| Creativity                             | 0.630                              | 0.259  |
| Self-confidence                        | 0.914                              | 0.282  |
| Deeper understanding of<br>the content | 0.402                              | 0.606  |

It was observed that learning autonomy, creativity and self-confidence presented higher loadings in Factor 1. These data suggest that the trainee teachers had considered these three components all at once when designing the project. Given the analogous patterns of loadings, we have termed these variables under the umbrella of non-linguistic skills since they seemed to involve learning capacities related to PBL that were not concerned with L2 English learning. Other components such as L2 reflection, L2 authentic use and deeper understanding of the topic showed higher loadings in Factor 2. Therefore, these patterns appeared to revolve around psycholinguistic skills, linguistic skills and cognitive skills, respectively.

The quantitative data therefore suggest that the trainee teachers believed that PBL (a) motivated Masters students in L2 English learning; (b) improved L2 English language proficiency skills; (c) increased content knowledge of the topics addressed in the module they were enrolled in; (c) developed non-linguistic skills such as learning autonomy,



creativity and self-confidence; (d) boosted psycholinguistic skills such as L2 English reflection; (e) promoted linguistic skills such as L2 English authentic use; and (f) aided in the development of cognitive skills such as the deeper understanding of the project topic.

## 5.2. Qualitative Data

As shown in [Table 1](#) (section 4.3), the qualitative data analysis was concerned with the free responses of the questionnaire to provide further insights into two main dimensions, namely, language proficiency skills in PBL and content knowledge acquisition. The size of the corpus collected with the qualitative responses is illustrated in Appendix II.

When the trainee teachers were asked how they learned L2 English while completing the project, they claimed that they did so by means of analyzing the lexicon and specialized terminology while reading the recommended resources proposed for the project (for instance, academic papers or textbooks). Furthermore, they reported that they made use of (un)grammatical structures that L1 speakers produce (for instance, the use of collocations, prepositions, synonyms and verbal tenses). The reflection of their own learning process (for example, by self-correcting mistakes) and content knowledge improvement were also considered during the project design.

The trainee teachers stated that they used online Information and Communication Technology (ICT) tools (for instance, online dictionaries and language corpora), grammar books and other topic-related offline bibliographical resources (for example, research papers). These resources allowed them to learn new lexicon, improve their writing skills, gather and analyze information, use language in context and be aware of the project layout, letter and punctuation style.

Asking for L1 English speakers' help was another resource for L2 proficiency improvement skills. Some participants did not consider that they had improved their L2 English proficiency abilities, claiming that they were more aware of the project process than focusing on the language. Others argued that they already had an advanced L2 competence before completing the project.

They also reported that they could not find a high enough number of examples in order to carry out error analysis, as observed when they interviewed an L2 English advanced learner. Furthermore, they were unsure about the corrections of the interviewed learner's errors, given that they felt they did not present an L1 English speakers' intuitions for error identification, finding metalinguistic explanations for errors and, ultimately, classifying the type of errors produced (for instance, L1 interference and slip of the tongue). Accessing L2 English learners to interview, assessing their L2 level, implementing methodological strategies to elicit speech data and, finally, transcribing the recordings were four further challenges that the participants encountered. The trainee teachers also highlighted the challenge of using specific English-related syntactic and semantic terminology that accounted for the interviewed learners' errors as well as the project word length.

All the trainee teachers believed that they improved their knowledge of syntax, morphology and semantics as well as the content related to Psycholinguistic Analysis of English Acquisition. They also claimed that they developed analytical and project management skills, learning about text coherence and cohesion devices, text structure as well as teaching strategies and resources to be implemented in L2 English classrooms, as required in project 2. Additionally, all the participants expanded their knowledge of L2 English learning by reading scientific papers and books that gave them a deeper understanding of the role played by L1 in L2 English learning.

All the trainee teachers agreed that the project made them reflect on language learning and on language use. In turn, it helped them focus on L2 English learners' syntactic, morphological and semantic mistakes, thus, developing metalinguistic awareness. These findings therefore showed that projects were reported to be an effective learning methodological approach that triggered students' motivation in L2 English learning, integrated the four language skills, developed the awareness of their own and other learners' mistakes and promoted critical thinking, creativity and active learning while simultaneously achieving a PBL-oriented goal. It was also claimed that PBL gave L2 English learners access to authentic written language since both two projects required the reading of offline resources such as books or scientific papers.

## 6. Discussion of Results

### 6.1 Attitude and Motivation towards L2 English Learning before and After Completing the Project

Based on the findings reported in section 5, and in light of RQ 1, a high rate of the trainee teachers (91.5%) reported feeling motivated to continue learning English after completing the project. These results are in line with the work of [Supe and Aivars \(2015\)](#) since the 12-to-15-year-old students' opinion poll also reflects that the attitudes towards studying English through projects are positive after the project is carried out (56%). The rationale behind the trainee teachers' motivation towards L2 English learning after the project submission is connected to other PBL-related issues ([Gillies, 2007](#); [Pham, 2018](#); [Poonpon, 2011](#); [Vygotsky, 1978](#)), as shown by the high rate of mean scores in the Likert scale (that is, 3.6 to 4.1). This suggests that these findings lent support to the participants' positive perceptions on the development of non-linguistic skills (namely, learning autonomy, since students are self-led when acquiring new knowledge, creativity, and self-confidence), as evidenced by the high loadings per component (mean range: 0.607 to 0.914), as well as on the development of (psycho)linguistic and cognitive skills (L2 English reflection and metalinguistic awareness, real language use and deeper understanding of the topic), as evidenced by the high loadings per component (mean range: 0.606 to 0.797). In fact, a significant correlation among the high rate of perceptions on other PBL issues was statistically reported through the implementation of a PCA (see

section 5.1). Furthermore, positive attitudes and motivation towards L2 English learning via projects could have arisen by the enhancement of critical thinking skills and information analysis abilities, as will be discussed further in response to RQ 2. In fact, a significant correlation among the high rate of the participants' perceptions on the issues discussed earlier was statistically reported through the implementation of a PCA (see section 5.1).

## 6.2. Perceptions on the Development of L2 English Proficiency Skills After PBL

In response to RQ 2, the findings revealed that the trainee teachers considered that the two projects proposed contributed to the development of their L2 English lexico-linguistic knowledge (mean range of standardized loadings: 0.79 to 0.93). This was reported to be achieved via the use of specialized terminology found in the reading of recommended authentic resources, the awareness in the use of (un)grammatical constructions through self-correction and, more specifically, the production of structures that result from L1 influence (see the trainee teachers' L1 in section 5.2). Given the wide range in the trainee teachers' L1, we leave this study open for further research to shed light on the role played by L1 in the L2 English participants' written output in the project design. A third aspect that was also taken into consideration by the trainee teachers' improvement of lexico-linguistic knowledge was written production. This was considered to be developed through the use of ICT tools, grammar books and research papers that allowed the trainee teachers to analyze information and develop an understanding of structural organization and in a written project. Thus, these data confirm the findings reported by previous empirical works as they also observe that projects foster the integration of the four language skills (Simpson, 2011; Supe and Aivars, 2015), the knowledge of a higher lexical array (Kimsesiz *et al.*, 2017) and the L2 written style (Praba *et al.*, 2018).

## 6.3. Perceptions on the Knowledge Acquisition of the Module Content After PBL

In the light of RQ 3, the trainee teachers claimed that the implementation of the two projects enhanced the content knowledge of issues related to Psycholinguistic Analysis of English Acquisition, as evidenced by the high standardized loading in the EFA analysis (namely, 0.99). Regarding the latter, the trainee teachers reported that the two projects helped them understand how an L2 is learned, as well as the morpho-syntactic and semantic patterns that lie behind English, as achieved via the use of authentic offline resources. In turn, it was also claimed that the project developed project management and analytical skills. These data lent support to the results observed in earlier empirical works on the effectiveness of PBL in content learning (Kimsesiz *et al.*, 2017; Pham, 2018; Srikrui, 2008).

Given the challenges encountered in the completion of the project, we recommend L2 English trainee teachers consider the following issues before implementing the two projects proposed in this study: (a) students may feel they do not present an analogous intuition to that of L1 English speakers when identifying L2 English learners' errors; (b) L2 English learners' selection could be demotivating for students in project-based interviews given the lack of availability and access; (c) selecting techniques for participants' data elicitation should be explained by the teacher beforehand so that students have a broader knowledge of their implementation in their own projects; (d) the use of specific terminology should be analyzed before the project is carried out and (e) project word length should also be considered given that long projects may not contribute in developing students' positive attitudes and motivation in L2 English learning through PBL.

## 7. Conclusion

The results obtained in the perception questionnaire conducted in this study have revealed that the trainee teachers' Masters students enrolled in the Psycholinguistic Analysis of English Acquisition online module at *xxx-removed for blind review* considered that PBL is an effective teaching and learning method for L2 English pedagogical purposes. Firstly, they have increased their motivation in continuing the process of L2 English learning through the PBL methodology. Secondly, the findings analyzed in our quantitative and qualitative responses have also shed light on the fact that implementing PBL contributes to the development of L2 English language proficiency skills, as measured by the integration of the four language skills, the development of lexico-linguistic knowledge and real language use. Thirdly, PBL was also reported to aid the development of other skills such as learning autonomy and self-confidence, critical thinking, reflection on the working process and the final product design, information research abilities and abilities to carry out complex tasks. And, fourthly, with regards to content acquisition, the participants perceived that PBL is an effective learning approach that enhances the content knowledge involved in the project.

Some potential limitations of the study should be addressed. One of the main concerns about working with case studies is the extent to which they can indeed represent the L2 English trainee teachers' opinions on PBL and, in our case, how they can elucidate the effectiveness of projects that combine content knowledge on Psycholinguistic Analysis in English Acquisition and L2 English language proficiency skills. This implies that the findings of this study cannot be representative for the whole population of the sample analyzed. Further work will clarify the effectiveness of the methodology used in the present work in other tertiary educational settings. We also leave this study open for further research so as to investigate whether alternative student-centred teaching methods (for instance, Task-Based Learning) can be effective in learning English as an L2. The findings of this future study will be compared to the learning outcomes obtained in this work.

## Declarations

### Funding

This work is derived from the research project entitled "Information and Communication Technologies for e-Administration: towards improving communication between Administration and citizens through clear language (ICT-eADMIN)", funded by the Ministry of Science, Innovation and Universities in the 2018 call for R&D Projects of the State Knowledge Generation Subprogram (reference PGC2018-099694-A-I00), and developed in the Department of Foreign Philologies and Linguistics of the Faculty of Philology of the National University of Distance Education (UNED), within the ACTUALing research group. We would like to thank Iban Mañas Navarrete for his help in statistical analyses.

### Conflicts of interest/Competing interests

Not applicable

### Availability of data and material

The two projects used to collect the data in the present study were taken from *Course Syllabus ESU 561 Aspects of the English Language*, taught by Dr. Bart Weyand at the University of Suthern Maine, fall 2014 (<https://docplayer.net/4532034-Course-syllabus-esu-561-aspects-of-the-english-language-fall-2014.html>). Permission to use the projects has been granted by the author.

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