# The Impact of Wikis and Discussion Boards on Learning English as a Second Language. A Mixed Methods Research

**Mª Cruz Sánchez-Gómez**

mcsago@usal.es

University of Salamanca, Spain

**Ana Mª Pinto-Llorente**

ampintoll@usal.es

University of Salamanca, Spain

**Francisco José García-Peñalvo**

fgarcia@usal.es

University of Salamanca, Spain

## Abstract

In the field of teaching a second language (L2), technology has always occupied a relevant position. The development of new technological tools has allowed the convergence of two learning environments, traditional face-to-face learning and virtual learning. This convergence has fostered the advantages of both types of instructions and the possibilities to learn a L2. In this study, researchers tried to explore pre-service teachers' perspectives towards the use of wikis and discussion boards to improve writing skills in English and promote autonomous and collaborative learning in a B-learning environment. 358 pre-service teachers participated in the study in which a mixed methods research approach was adopted to integrate results and have a broader vision of the phenomenon. The results suggested pre-service teachers' positive perception of the e-activities developed to improve the quality of their English, feeling more confidence in that language. They highlighted the opportunities afforded by wikis to create collective texts based on their agreements and individual contributions that promoted individual and cooperative learning, and by discussion boards to communicate, solve problems, get consensus or support a dynamic process. The fact of using a mixed methods research approach enhanced the validity and reliability of data, and added rigor to the study.

## Keywords

B-learning environment; Mixed Methods Research; Discussion Boards; Wiki-Based Tasks English as L2

## I. Introduction

The current research is the result of an interdisciplinary project, which addressed two important fields. On the one hand, the process of learning, practicing and improving English as a second language, specifically the skills that referred to writing and reading. And, on the other hand, the B-learning modality, as the kind of approach that responds to the educational demands of the present knowledge society, and the asynchonous technological tools (wiki and discussion boards) provided by Moodle.

The purpose of teaching English as a second language (L2) is to provide learners with the necessary skills to carry out an adequate communication. Usó & Martínez (2006) show the necessity of developing students' level of listening, speaking, reading & writing to produce and interpret any piece of written or spoken discourses, and to communicate perfectly. In this study researchers concentrated on two on these skills: reading and writing. There are different definitions of them, for example, Woolley (2011) refers to reading as the process of making meaning from text, that is to say, to gain an overall understanding of what is described in the text rather than to obtain meaning from isolated words or sentences. Regarding his words, it can be stated that reading does not only refer to the process of decoding a text word by word, but it also implies to understand what a person is reading in a particular context and about a specific topic (Pressley, 2000). On the other hand, Nunan (1989) defines writing as the written products of thinking, drafting, and revising that require specialized skills on how to generate ideas, how to organize them coherently, how to use discourse markers and rhetorical conventions coherently into a written text, how to revise text for clearer meaning and how to edit text for appropriate grammar and how to produce a final product. In this definition the author clearly emphasizes how the learner of the L2 must master aspects such as grammar or vocabulary, and others more complex as cohesion and coherence that must always exist in a well-written text (Lado, 2000).

In the field of teaching a L2, technology has always occupied a relevant position. Moreover, the development of new technological tools has allowed the convergence of different learning environments, traditional face-to-face learning and virtual or online learning, increasing the possibilities that people have to learn a L2 (Coaten, 2003; García-Peñalvo, 2008; Güzer & Caner, 2014; López & Matesanz, 2009). The combination of these environments has led to the development of the B-learning approach that Graham (2006:5) defines as *part of the ongoing convergence of two archetypal learning environments. On one hand, we have the traditional face-to-face learning environment that has been around for centuries. On the other hand, we have distributed learning environments that have begun to grow and expand in exponential ways as new technologies have expanded the possibilities for distributed communication and interaction*. This convergence implies the development of a new kind of education that stresses the advantages of both types of instructions (García & García, 2005; Graham, 2006; Osguthorpe & Graham, 2003). B-learning allows face-to-face interactions between the protagonist of the teaching-learning process through the development of different face-to-face activities in which all of them meet in a specific classroom and in a specific period of time previously defined. Moreover, the e-learning platform used and its synchronous (chat) and asynchronous tools (discussion boards, wikis, online glossaries and online questionnaires) facilitate the distribution of contents, learning experiences and interaction between teacher and students in a virtual environment at any time and any place.

As Thorne (2003:18) highlighted *blended learning represents a real opportunity to create learning experiences that can provide the right learning at the right time and in the right place for each and*

*every individual, not just at work, but in schools, universities and even at home. It can be truly universal, crossing global boundaries and bringing groups of learners together through different cultures and time zones. In this context blended learning could become one of the most significant developments of the 21st century*. B-learning modality has become the kind of education that responds to the educational demands of the current knowledge society. People needs to carry on studying and this instruction allows them to do it since it eliminates the inflexibility and the spatial and temporal barriers of traditional modality, producing a change in the learning approach towards a more open education in which students are more involved and more active in the construction of knowledge (Arteaga & Duarte, 2010; Pinto-Llorente et al., 2017a). In this study, researchers tried to explore pre-service teachers' perspectives towards the use of wikis and discussion boards to improve writing skills in English and promote autonomous and collaborative learning in a B-learning environment. They have tried to extend the existing research on the use of these tools in second language learning (SLL) and to give a new perspective of their uses. In the following lines, they reviewed the most relevant prior studies related to asynchronous tools (wiki and forum) used for teaching and learning English as a second language.

In 2007 Farabaugh (2007) conducted a study at Cornell University in different literature courses. Two different versions of the wiki software (QwikiWiki and MediaWiki) were used. The researched concluded that this technology was a good tool to carry out reading and writing assignments that encouraged language awareness in the literary domain. The results also emphasized that this asynchronous tool was appropriate to improve writing skills, to extend group work outside the class, to promote collaborative writing, and to help students to create their own knowledge rather than just receiving it from teachers. The study of Fitze (2006) also expressed the positive aspects of using forum to teach a foreign language. In this occasion it was combined traditional and online instructions through an e-learning platform. The study concluded that there was a broader range in the vocabulary used, as well as a greater interaction and participation of students in written expression. The study conducted by Kol & Schcolnik (2008) also focused on the use of forum in the teaching-learning process of English. The main goal of this research was to establish valid criteria to assess students' contributions. It emphasized students' positive perceptions towards the use of this tool to improve written skills. The research of Twu (2010) pointed out learners' positive attitude towards language learning in Wiki environments, and towards interaction developed in a second language throughout wiki environments. The results identified some effective strategies to involve students in the activity, to maximize the learning environment of a L2, using wiki as a tool of communication, and to build a learning community. The study of Mak & Coniam (2008) was conducted in a high school in Hong Kong. The level of English of the students that participated in the study was intermediate. Regarding the results, the use of wiki allowed students to develop their writing skills, and promoted collaborative writing between students with a minimal input and supported from teachers.  The research of Kovacic, Bubas & Zlatovic (2008) was carried out in November 2006 at the University of Zagreb, Croatia, and was developed during the 2006/2007 and 2007/2008 academic years. They wanted to assess the applicability of wiki in teaching English for special purposes to engage students in different individual and collaborative online learning activities, to evaluate these activities, and to allow them to choose the most appropriate tasks to learn a L2. The main results emphasized how the use of this tool allowed students to participate more actively in the course, to contribute to the development of activities, and to demonstrate what they had learned. The teachers also had different elements to evaluate students' participation more precisely and objectively. The students concluded that they had improved both their writing skills and vocabulary. In the research carried out by Franco (2008) the use of wiki was also

emphasized. The study was developed in Brazil and the aim was to analyse the use of wiki to promote peer correction in a virtual group environment. The results confirmed, once again, the participants' positive attitudes towards the use of this technological tool to learn English. Pinto, Sánchez & García (2015a) carried out a quantitative research with an ex-post-facto design to highlight the benefits of some transmissive, interactive and collaborative tools such as podcast, videocast, online questionnaires, online glossary and forum in learning English Phonetics and Phonology. The findings of the research demonstrated that participants were quite satisfied with the model implemented in the blended learning modality as well as with the transmissive, interactive and collaborative resources used to develop the activities to help them to practice and improve their level in English pronunciation. They considered that the VLE implemented helped them to perceive and produce English more accurately. The study of Aydin & Yildiz (2014) focused on the use of the collaborative tool wiki in collaborative writing projects in foreign language learning classrooms. The sample of the research was composed of a total of 34 intermediate level university students learning English as a foreign language. During the course learners had to accomplish three wiki-based collaborative writing tasks in groups: an argumentative one, an informative one and a decision-making one. The results pointed out that the argumentative activity promoted more peer-corrections than the other ones. And the informative task generated more self-corrections than the other activities. Findings also emphasized that 94% of the time, the use of wiki-based collaborative writing activities contributed to the accurate use of grammatical structures. Participants' perceptions were quite and considered that their writing performance improved through the use of wikis. Ferriman (2013) developed a quasi-experimental study into the impact of a blended e-learning environment on academic writing assignments in English at Thai International College. An experimental group of students used an on-line bulletin board and face-to-face communication in class to share information for essay topics they were preparing. A same size control group used only face-to-face communication for the same task. The experimental and control groups were compared on three variables for each of the 3 essays they wrote: number of references used; word counts; essay score. The results indicated that the experimental group had higher means on six of the nine outcomes.

Researchers also highlighted the study of Lund (2008) in Norway about the use of wiki as a collaboration tool in teaching English. The results of the study showed that wiki was an appropriate tool to promote collaborative and cooperative abilities in learning foreign languages. The experience developed by Savignon & Roithmeier (2004) focused on using forum as a tool to promote cultural exchange and learn a L2. That exchange took place between students who were learning German in the USA, and students learning English in Germany. Students of both countries participated in different discussion topics during several weeks through forums. The study pointed out that there were evidences of collaborative dialogue, and cooperative construction of texts, as well as the use of asynchronous communication strategies to promote the exchange of knowledge and create a community of learning. Finally, it is highlighted the research carried out by Miyazoe & Anderson (2010). They discussed the positive effects of the simultaneous implementation of three written activities through technological tools such as forum, blog, and wiki in a blended learning environment for teaching and learning English at Tokyo University. The results of the study emphasized the positive students' perception of these three tools, highlighting wiki as the most favourable one, followed by blog and forum. The study established the usefulness of each one of the online writing tools, and observed a general improvement in participants' writing abilities.

## II. Method

The objective of the research was to explore pre-service teachers' perspectives towards the use of wiki-based tasks, and discussion boards to improve writing skills in English, and promote autonomous and collaborative learning in a B-learning environment.

Researchers employed a mixed methods research that as Anguera (2008) states is the combined use of qualitative and quantitative methodology, since it is interested in the process and the result, enhances the mutual invigoration of the two types of methods, and facilitates the triangulation through operations. Delgado (2014) emphasizes this idea and points out that it is not juxtaposition but a flexible combination of the components of both methods. She reinforces this idea and states that it is a combination of the formal rigour of the quantitative method and the creativity and plasticity of the qualitative one. Qualitative and quantitative data collection and analysis aim at integrating results and carrying out a combined discussion that allows making interferences to understand better and to have a broader vision of the phenomenon.

According to the works done by different authors (Bryman, 2008; Delgado, 2014; Hernández et al, 2014; Sánchez-Gómez, 2015), a mixed methods research approach has the following characteristics:

1. Triangulation (quantitative and qualitative corroboration)
2. Complementation (clarification of the results of one method on the basis of the other)
3. Holistic vision (complete and integral approach)
4. Development (the results of one method as a support of the processes of the other: sampling, collection, data analysis, new hypotheses, etc.)
5. Initiation (to discover contradictions, new frames of reference, to modify original approaches with the results of the other method)
6. Expansion (one method can expand the knowledge obtained by the other)
7. Compensation (the weaknesses of one method can be made up for the other)
8. Diversity (different views of the problem)
9. Clarity (to display elements which were not detected by a single method)
10. Credibility and improvement (reinforcing arguments, results and procedures)

### a. Participants

Four hundred and fifty-one pre-service teachers composed the population of the research. They were studying the last year of the Degree in Primary Education: English at the Faculty of Education at the Pontifical University of Salamanca. All of them were enrolled in the subject English I, a compulsory subject that had 6 ECTS (European Credit Transfer and Accumulation System), each ECTS was equivalent to 25 hours of work for participants. The quantitative sample was a probability sample since everybody had the same probability of being chosen and included in the study. Researchers used the formula proposed by Cea D'ancona (1998:170) to calculate the sample size needed to be a representative probability sample of the population indicated above. Figure 1 shows the result obtained.

The sample was composed of a total of 358. It guarantees the minimum required size with a margin of error of 2.5% so that the final sample is sufficiently representative and meet the representativeness requirements to continue the research work, reach conclusions that could be

generalized to the whole or a larger population. The kind of sampling was cluster sampling since all the members formed natural groupings.

$$n = \frac{Z^2 \hat{P}\hat{Q}N}{E^2(N-1) + Z^2\hat{P}\hat{Q}} = \frac{2^2 \times 50 \times 50 \times 451}{(2,5^2 \times 450) + (4 \times 50 \times 50)} = 352$$

Figure 1. Formula to calculate a probability sample
Source: D'ancona (1998:170)

The quantitative sample of the study consisted of 358, 83 men (23.2%) and 275 women (76.8%), with an average age of 29.49 (SD = 5.99). They were divided into four different age groups: 20-24 (24.6%), 25-29 (25.7%), 30-34 (34.4%), and 35 or older (15.4%). All of them had already finished a previous university Degree and the majority of them had completed a Degree in Primary Education (70,70%, n=253). Regarding their professional status, 82.1% (n=294) were already working, and 70.70% (n=253) had a job related to education, holding the position of teachers in infant (22.1%), primary (28.2%) and secondary education (7.3%). 80.40% pointed out that it was the first time that they studied a university degree in blended learning modality, so they did not have a previous experience in this kind of learning. 88.8% of them stated that they had never used an e-learning platform before. Over half of the pre-service teachers (51.40%, n=184) emphasized that they had decided to study the Degree in Primary Education: English for professional reasons. Another 23.20% (n=83) pointed out that it was for professional reasons and to improve the level in the second language. Regarding their level of English, and according to the Common European Framework of Reference for Languages (CEFR), they majority had an intermediate level (B1).

On the other hand, the qualitative sample of the research was non-probabilistic, cumulative and sequential since researchers had the sample needed to get enough information. Researchers employed a theoretical sampling approach, carrying out the necessary interviewees to achieve theoretical saturation, the data saturation, to meet the goals of the research. Glaser & Strauss (1967:45) define theoretical sampling as *"the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyses his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges. This process of data collection is controlled by the emerging theory, whether substantive or formal."* The sample was composed of 91 pre-service teachers, 46 females and 45 males. In the following table (Table 1) there is a more detail description of this sample.

| WOMEN | | MEN | |
|---|---|---|---|
| AGE GROUP | PARTICIPANTS | AGE GROUP | PARTICIPANTS |
| 20-24 | 11 | 20-24 | 10 |

| 25-29 | 12 | 25-29 | 13 |
| 30-34 | 11 | 30-34 | 11 |
| 35 or more than 35 | 12 | 35 or more than 35 | 11 |

Table 1. Qualitative Sample
Source: Own work

### b. Variables and Instruments

The instruments used to collect quantitative and qualitative data were a pre-test and a post-test, and a semi-structured interview. On one hand, the pre-test and post-test were used to collect quantitative data. They were designed in three phases. First of all, the researchers designed the initial draft based on the literature reviewed. They carried out different decisions about the relationship between the items of each part of the questionnaire. That initial draft contained a large number of items. In the second phase of the design, a panel of five experts in educational research, English and technology collaborated in the study. They reviewed and evaluated the items of the initial draft and elaborated a report in which they stated the adequacy or not of the items, the appropriate scales of measurement, the readability and the comprehension of the tests for the purpose of the research. In the last phase, the researchers took into account the experts' report to carry out the changes proposed and to select the items of the final questionnaires, which were divided into three parts: sociodemographic details, English as a second language, and Technology. They contained several types of questions: open, close, yes/no, short answer, multiple choice, and five-point-Likert scales. The pre-test contained 19 items and the post-test 30. The first part of the tests included 5 items about pre-service teachers' sociodemographic details: age, gender, studies, professional status, and education level in which they worked. It contained different kind of questions: open, close, yes/no and multiple-choice. The second part of the test contained 9 items about English as a second language. In that part of the questionnaires participants were asked to self-assess their level of writing, reading, vocabulary, grammatical competence, discourse competence, culture, and their confidence in the second language. The post-test also included two questions one about participants' level of English, and another one about peers' level of English in the e-activities. Answers were coded using a Likert scale ranged from 'excellent' to 'poor'. For that research 'Poor' was coded as 1; 'Fair' as 2; 'Good' as 3; 'Very good' as 4 and 'Excellent' as 5. The third part of both tests contained items about technology. The pre-test included 5 items pre-service teachers' digital competence, their knowledge about the use of a wiki or a forum. The answers of these items were coded with a Likert scale ranged from 'excellent' to 'poor'. For this research 'Poor' was coded as 1; 'Fair' as 2; 'Good' as 3; 'Very good' as 4 and 'Excellent' as 5. Participants were also asked about the participants' frequency of participation in forums and in wiki-based e-activities. In that case, answers were coded using a five-point Likert scale ranged from 'everytime' to 'never'. For this study, 'Never' was coded as 1; 'Almost never' as 2; 'Sometimes' as 3; 'Almost everytime' as 4 and 'Everytime' as 5. On the other hand, the post-test contained 16 items. Pre-service teachers were asked to self-assess their improvement in their digital competence, using a five-point Likert scale ranged from 'excellent' to 'poor' to code their answers. 'Poor' was coded as 1; 'Fair' as 2; 'Good' as 3; 'Very good' as 4 and 'Excellent' as 5. There were also items to gather data on pre-service teachers' perception of the efficacy of wiki-based e-activities to improve their knowledge of the L2, to construct knowledge, to create a learning community, to carry out collective authorship, to support autonomous, cooperative learning and to change roles: authors, editors, assessors, & guides; and also about the efficacy of discussion boards to communicate, to get consensus, to resolve conflicts, to provide a constructive feedback, and to support a dynamic

process. A five-point Likert scale ranged from 'absolutely effective' to 'absolutely ineffective' was used to code' answers. 'Absolutely ineffective' was coded as 1; 'Very ineffective' as 2; 'Neither effective nor ineffective' as 3; 'Very effective' as 4 and 'Absolutely effective' as 5.

The participation of different specialists in the design of both tests provided their external validity. Regarding their internal consistency, we calculated the Cronbach's alpha. The coefficients obtained ($\alpha$=0.853, $\alpha$=0.845) suggested that their measures were consistent and stable.

On the other hand, the semi-structured interview was the instrument used to collect qualitative data. They were conducted to go more deeply into pre-service teachers' personal usage perspectives and experiences towards wiki-based tasks and discussion boards to improve their level in English as second language. The researchers decided to use an interview guide approach so before starting the different sessions, they prepared a set of questions that referred to the specific phenomenon of the study. Although they had that a list of questions, they were totally free to reword them and change their order. Referring to the reliability of the coding, researchers had the collaboration of 16 experts in these matters who were invited to code the interviews and generate their own coding. Researchers compared experts' encodings with theirs to identify the agreements that existed between them, with an agreement of 81%. That level of reliability meant that the encodings were valid and determined which category was part of the final conceptual map.

### c. Data collection and Analysis

Researchers collected quantitative data at the beginning and at the end of the academic year. The pre-test and post-test were hosted on the virtual learning environment (VLE) of the subject English I. Pre-service teachers were provided with a username and password in order to get access to them. Once the fieldwork was finished, researchers ordered and coded data to enter them in the software SPPS24. They took into account the nature of the variables to carry the statistical analyses: descriptive statistics (frequencies and percentages) and inferential (paired sample t-tests, and analysis of variance: ANOVA).

Regarding the qualitative data collection and analysis, researchers collected the data for three months, from May to July. They followed the phases of the scheme proposed by Miles & Huberman (1994) to analyse qualitative data (Figure 2):

- data reduction phase: researchers carried out the separation of units according to thematic criteria, they decided to use the line as textual unit not to distort the meaning of the texts. They also identified and classified the elements through categorizing and coding of data units to recognize their thematic components and classify them in a certain content category. Categories were defined deductively, with a priori categories, and inductively, introducing modification when data were examined, so categories were renamed or eliminated. Researchers used the software NVIVO11 to carry out categorizing and coding.
- data display phase: researchers arranged qualitative data in different tables and figures, using the software Microsoft Office Word to illustrate the qualitative results.
- drawing and verifying conclusions phase: researchers presented the results, their interpretation and the extraction of the conclusions from the study.
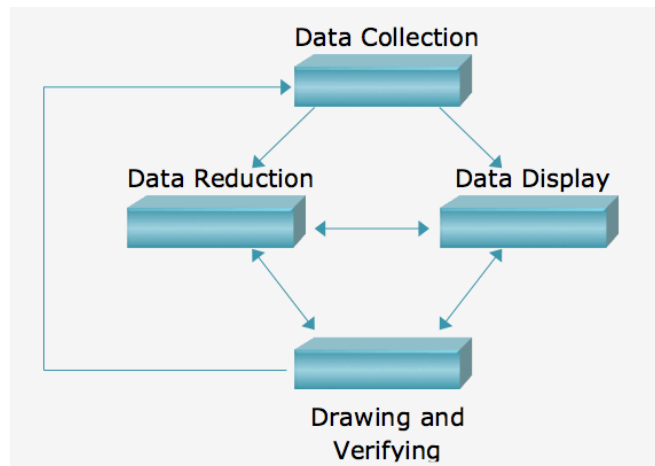
Figure 2. Phases of the Scheme to Analyse Qualitative Data
Source: Own work based on Miles & Huberman (1994)

They carried out a total of 91 individual semi-structured interviews at the Faculty of Education at the Pontifical University of Salamanca at times convenient to each participant. Researchers did the semi-structured individual interviews until theoretical saturation occurred *when no additional data are found that advance, modify, qualify, extend or add to the theory develop* (Glaser & Strauss, 1967:61). At the beginning of each session researchers introduced themselves, presented the goal of the study and projected a video about education & technology (Pinto-Llorente, Sánchez-Gómez, & García-Peñalvo, 2015b). They decided to record all the interviews, asking pre-service teachers for their permission, to facilitate their transcription and be aware not just of what pre-service teachers said in a specific moment, but also the way in which they said them, keeping intact pre-service teachers words. Interviews varied between thirty-five and fifty-one minutes.

## III. Results

In the following subsections of the article, the results obtained in the analyses carried out with the quantitative and quality data are presented.

### a. Quantitative Results

Pre-service teachers were asked to self-assess their level of different aspects about English as second language (L2) at the beginning of the academic year. Those aspects referred to writing (item8); reading (item9); vocabulary (item10); grammar competence (item11); discourse competence (item12); culture (item13); and confidence in the L2 (item14) (Figure 3). Regarding writing ($\overline{x}$=2.83, Sx=.814), the majority of the participants self-assessed their level between good (46.9%, n=) and fair (31.6%, n=). Similar results were obtained when they self-assessed their level of grammar competence ($\overline{x}$=2.77, Sx=.829) since 47.2% (n=) considered that it was good and 32.4% (n=) fair. In the case of reading ($\overline{x}$=3.12, Sx=.831) and vocabulary ($\overline{x}$=2.94, Sx=.860) the main results were between fair (21.2% n=, 25.1% n= respectively), good (48% n=, 45.3% n= respectively) and very good (24.6% n=, 23.2% n= respectively). The data analysis also led to results that showed that participants self-assessed their level of discourse competence ($\overline{x}$=2.15, Sx=.884) and culture ($\overline{x}$=2.55, Sx=.890) between fair (53.9% n=, 50.8% n= respectively) and good (17.3% n=, 27.7% n= respectively). Finally, students estimated that their level of confidence in the second language ($\overline{x}$=3.41, Sx=.845) was good (31%, n=) and very good (47.2%, n=).
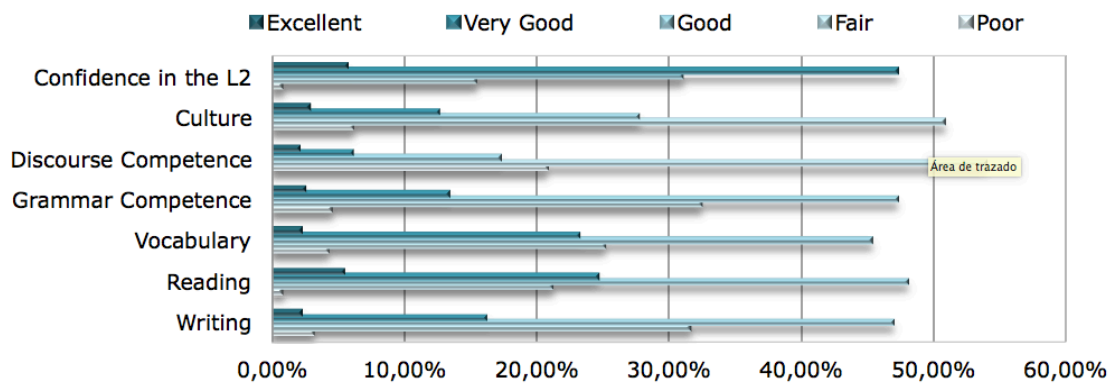
Figure 3. Statistics of the Dependent Variables Writing, Reading, Vocabulary, Grammar Competence, Discourse Competence, Culture and Confidence in the L2 at the Beginning of the Course
Source: Own work

At the end of the course, pre-service teachers self-assessed again their level of the aspects of the second language (L2) showed previously: writing (I6), reading (I7), vocabulary (I8), grammar competence (I9), discourse competence (I10), culture (I11) and confidence in the L2 (I12) (Figure 4). The results obtained emphasized that the majority of participants self-assessed better all these aspects and considered that they improved in all them through the e-tasks developed through wikis and discussion boards. In the case of writing ($\overline{x}$=3.98, Sx=.735), vocabulary ($\overline{x}$=4.10, Sx=.754), grammar competence ($\overline{x}$=3.89, Sx=.760) and confidence in the L2 ($\overline{x}$=3.99, Sx=.794) the majority of the participants self-assessed them between good (24.9% n=, 22.1% n=, 25.4% n=, 23.5% n=, respectively), very good (49.4% n=, 43.9% n=, 50.6% n=, 46.1% n=, respectively) and excellent (24.9% n=, 33.5% n=, 20.9% n=, 27.9% n=, respectively). In the case of reading ($\overline{x}$=4.09, Sx=.622) and culture ($\overline{x}$=4.28, Sx=.787) the results were better and most pre-service teachers considered that their levels were very good (61.5% n=, 37.7% n=, respectively) and excellent (24% n=, 46.6% n=, respectively). Finally, they self-assessed their level in the discourse competence ($\overline{x}$=3.54, Sx=.739) between fair (42.7% n=) and good (42.5% n=).
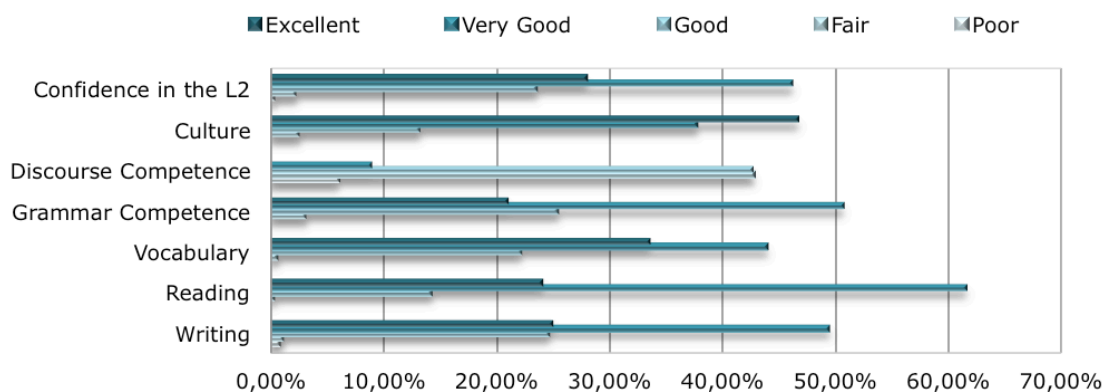


Figure 4. Statistics of the Dependent Variables Writing, Reading, Vocabulary, Grammar Competence, Discourse Competence, Culture and Confidence in the L2 at the End of the Course

Source: Own work

Researchers analysed the previous results to know if there were statistically significant differences (CI 95%) between the results of these items of the pre-test (item8, item9, item10, item11, item12, item13 and item14) and post-test (I6, I7, I8, I9, I10, I11 and I12). According to them, they appreciated that there were differences (Table 2) and rejected the null hypothesis, affirming that there was a clear relationship between the improvement of pre-service teachers' self-assessment of all these aspects, and their perspectives towards the effectiveness of all the e-tasks developed.

| | | MEAN | T | CORRELATION | SIG. | SIG. (2-TAILED) |
|---|---|---|---|---|---|---|
| PAIR 1 | WRITING & WRITING | -1.151 | -21.278 | .130 | .014 | .000 |
| PAIR 2 | READING & READING | -.969 | -18.942 | .135 | .010 | .000 |
| PAIR 3 | VOCABULARY & VOCABULARY | -1.162 | -18.207 | -.116 | .028 | .000 |
| PAIR 4 | GRAMMAR COMPETENCE & GRAMMAR COMPETENCE | -1.123 | -20.057 | .113 | .033 | .000 |
| PAIR 5 | DISCOURSE COMPETENCE & DISCOURSE COMPETENCE | -1.397 | -24.257 | .108 | .042 | .000 |
| PAIR 6 | CULTURE & CULTURE | -1.735 | -26.117 | -.121 | .023 | .000 |
| PAIR 7 | CONFIDENCE IN THE L2 & CONFIDENCE IN THE L2 | -.578 | -10.000 | .110 | .038 | .000 |
| *95% Confidence Interval of the Difference. n=358 | | | | | | |

Table 2. Paired Samples Correlations of the Dependent Variables of L2: Writing, Reading, Vocabulary, Grammar Competence, Discourse Competence, Culture and Confidence in the L2
Source: Own work

With regard to the dependent variable that referred to participants (I13) ($\bar{x}$=3.91, Sx=.546) and peers' (I14) ($\bar{x}$=3.91, Sx=.561) level of English in the e-activities developed, the majority of the pre-service teachers self-assessed them between good (22.3% n=, 25.1% n=, respectively), very good (55.9% n=, 51.4% n=, respectively) and excellent (19% n=, 21.2% n=, respectively) (Figure 5).
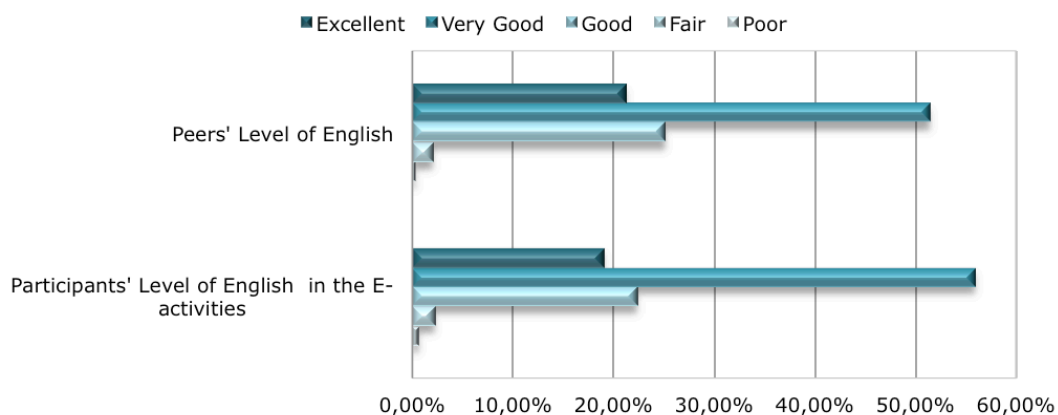


Figure 5. Statistics of the Dependent Variables Participants Level of English & Peers' Level of English in the E-activities
Source: Own work

At the end of the academic year pre-service teachers were also asked about the efficacy of wiki-based e-activities to improve their knowledge of the L2 ($\overline{x}$=4.14, Sx=.807), to construct knowledge ($\overline{x}$=4.07, Sx=.699), to create a democratic community of collaboration ($\overline{x}$=4.05, Sx=.651), to carry out collective authorship ($\overline{x}$=4.08, Sx=.652), to support autonomous learning ($\overline{x}$=4.03, Sx=.646), to support cooperative learning ($\overline{x}$=4.01, Sx=.674) and to change roles: authors, editors, assessors, & guides ($\overline{x}$=4.03, Sx=.700). The majority of the participants considered that they were very effective (42.20% n=151, 56.70% n=203, 59.20% n=212, 58.70% n=210, 60.90% n=218, 58.90% n=211, and 56.10% n=201, respectively) and absolutely effective (37.20% n=133, 26% n=93, 23.20% n=83, 24.90% n=89, 21.20% n=76, 21.50% n=77, and 24.0% n=86, respectively) (Figure 6).
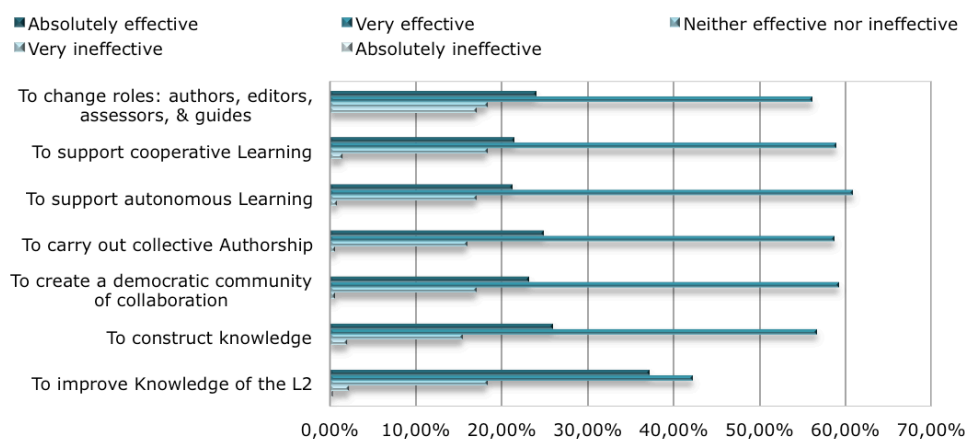


Figure 6. Statistics of the Dependent Variables of the Efficacy of Wiki-Based E-Activities
Source: Own work

Researchers analysed the previous results to know if there were statistically significant differences (CI 95%) between the age groups (20-24, 25-29, 30-34, 35 or more than 35). Regarding the results obtained, they appreciated differences in the dependent variables that referred to construction of knowledge (p=.000), creation of a democratic community of collaboration (p=.000), collective authorship (p=.000), autonomous learning (p=.000), and cooperative learning (p=.000). From the results so far, researchers could appreciate that there were statistically significant differences in the mean of the effectiveness of wiki e-activities between the groups as a whole. The results of the Tukey HSD post-hoc tests revealed that the differences existed between the mean of the youngest (20-24 & 25-29) and the groups of pre-service teachers aged between 30 and 34, and between 35 or more than 35. However, there were no statistically significant differences between the groups of students aged between 20 and 24, and between 25 to 29. The youngest pre-service teachers (20-24 and 25-29) stated that wiki e-activities were more effectiveness to construction of knowledge ($\overline{x}$=4.43 & $\overline{x}$=4.30, respectively), to create a democratic community of collaboration ($\overline{x}$=4.25 & $\overline{x}$=4.26, respectively), to carry out collective authorship ($\overline{x}$=4.28 & $\overline{x}$=4.25, respectively), to support autonomous learning ($\overline{x}$=4.25 & $\overline{x}$=4.26, respectively), and to support cooperative learning ($\overline{x}$=4.22 & $\overline{x}$=4.28, respectively) than those participants that belonged to the oldest age groups (30-34: $\overline{x}$=3.78, $\overline{x}$=3.84, $\overline{x}$=3.91, $\overline{x}$=3.82 & $\overline{x}$=3.78, respectively; and 35 or more than: $\overline{x}$=3.75, $\overline{x}$=3.85, $\overline{x}$=3.85, $\overline{x}$=3.73 & $\overline{x}$=3.71, respectively) (Figure 7).
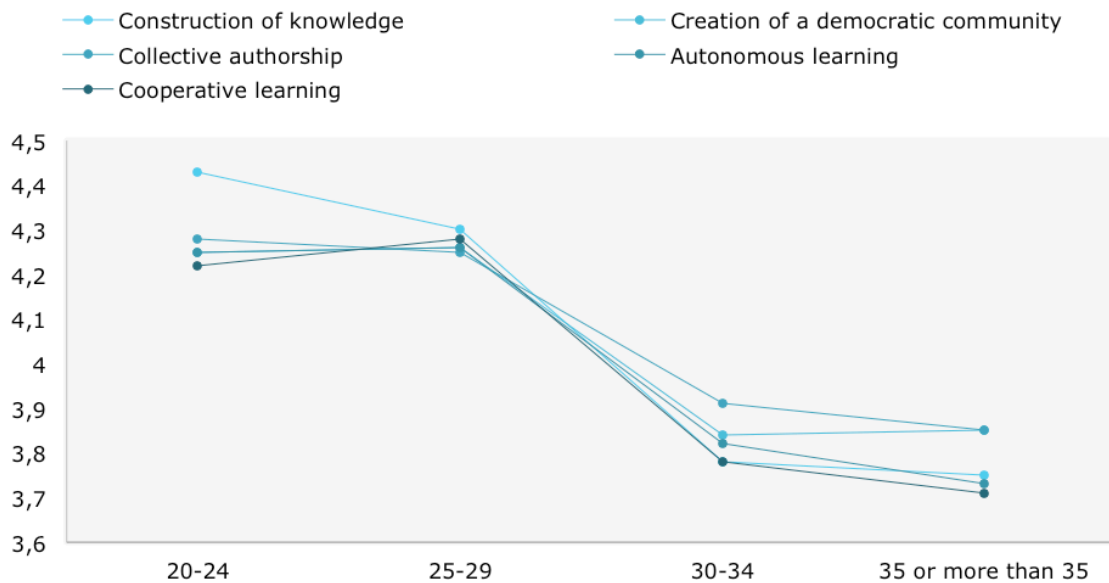
Figure 7. Results of the Tukey HSD Test of the Dependent Variables of the Effectiveness of Wiki-based Activities
Source: Own work

At the end of the academic year pre-service teachers were also asked about the efficacy of discussion boards to communicate ($\overline{x}$=3.94, Sx=.776), to get consensus ($\overline{x}$=3.94, Sx=.863), to resolve conflicts ($\overline{x}$=4.01, Sx=.657), to provide a constructive feedback ($\overline{x}$=4.02, Sx=.686) and to support a dynamic process ($\overline{x}$=4.07, Sx=.674). The majority of the pre-service teachers considered that they were very effective (50.6% n=181, 48.9% n=175, 60.3% n=216, 57.3% n=205, and 56.7% n=203, respectively) and absolutely effective (23.7% n=85, 26.3% n=94, 20.7% n=74, 23.2% n=83, and 25.7% n=92, respectively) (Figure 8).
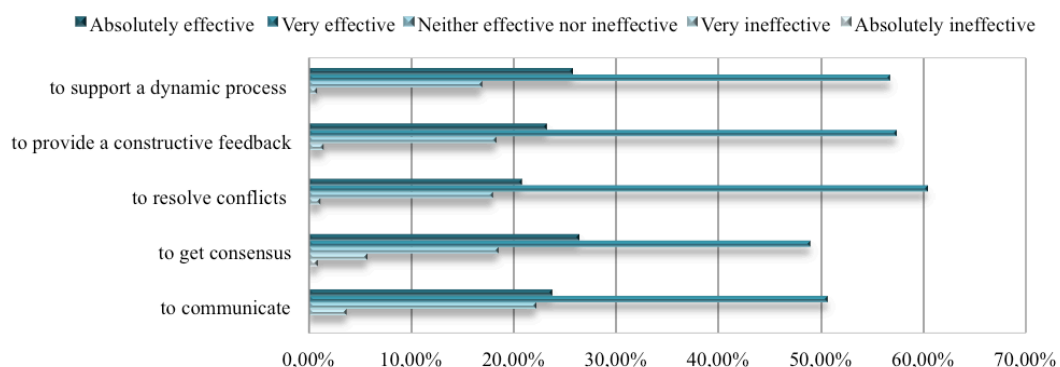


Figure 8. Statistics of the Dependent Variables of the Effectiveness of Discussion Boards
Source: Own work

Researchers analysed the previous results to know if there were statistically significant differences (CI 95%) between the age groups (20-24, 25-29, 30-34, 35 or more than 35). Regarding the results obtained, they appreciated differences in the dependent variables that referred to communicate (p=.000), to get consensus (p=.000), to resolve conflicts (p=.000), to provide a constructive feedback (p=.000), and to support a dynamic process (p=.000). From the results so far, researchers could appreciate that there were statistically significant differences in the mean of the effectiveness of discussion boards between the groups as a whole. The results of the Tukey

HSD post-hoc tests revealed that the differences existed between the mean of the youngest (20-24 & 25-29) and the groups of pre-service teachers aged between 30 and 34, and between 35 or more than 35. However, there were no statistically significant differences between the groups of students aged between 20 and 24, and between 25 to 29. The youngest pre-service teachers (20-24 and 25-29) stated that discussion boards were more effectiveness to communicate ($\bar{x}$=4.29 & $\bar{x}$=4.17, respectively), to get consensus ($\bar{x}$=4.39 & $\bar{x}$=4.17, respectively), to resolve conflicts ($\bar{x}$=4.25 & $\bar{x}$=4.24, respectively), to provide a constructive feedback ($\bar{x}$=4.34 & $\bar{x}$=4.23, respectively), and to support a dynamic process ($\bar{x}$=4.37 & $\bar{x}$=4.34, respectively) than those participants that belonged to the oldest age groups (30-34: $\bar{x}$=3.66, $\bar{x}$=3.60, $\bar{x}$=3.74, $\bar{x}$=3.77 & $\bar{x}$=3.79, respectively; and 35 or more than: $\bar{x}$=3.65, $\bar{x}$=3.62, $\bar{x}$=3.82, $\bar{x}$=3.73 & $\bar{x}$=3.80, respectively) (Figure 9).
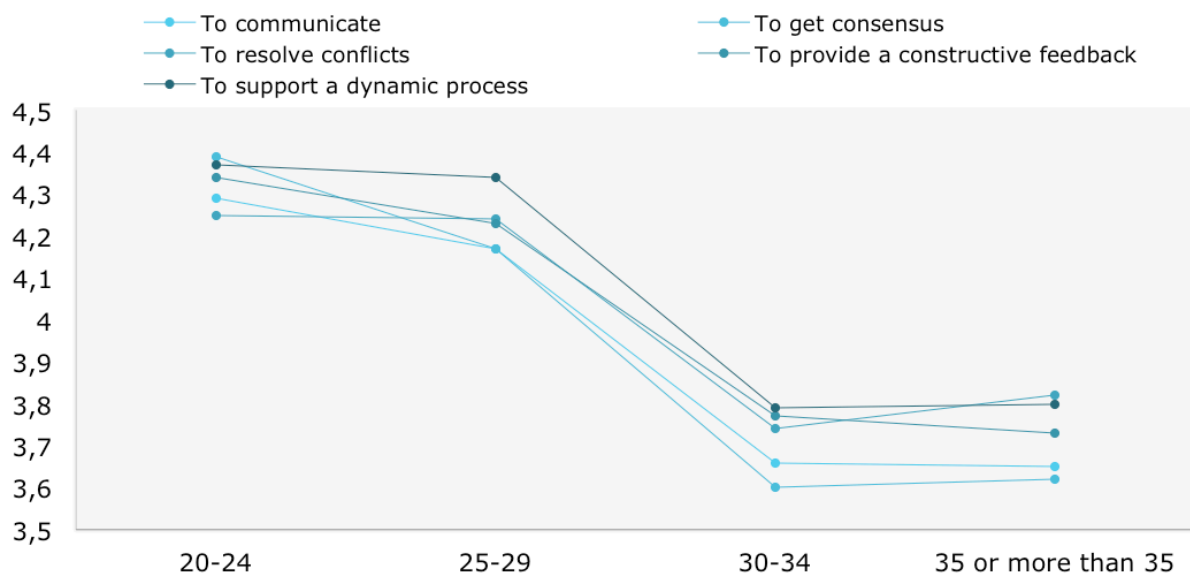


Figure 9. Results of the Tukey HSD Test of the Dependent Variables of the Effectiveness of Discussion Boards
Source: Own work

**b. Qualitative Results**

In this subsection, reserachers present the results obtained in the analyses carried out with the qualitative data. First of all, they describe the discursive positions expressed by the pre-service teachers in the semi-structured individual interviews. They are ordered according to frequency in a word cloud obtained through NVivo11. As it is showed in Figure 10, the words that appear with highest frequency were: communication (300 references), collective authorship (308 references), cooperative (273 references), English (267 references), second language (256 references), reading (246 reference), writing (244 reference), autonomous (229 references) assessment (210 references), grammar (210 references), community project (204 references), and feedback (184 references).

Figure. 10. Word Cloud
Source: Own work

The following conceptual map shows the relevant categories and subcategories of the analysis carried out of the pre-service teachers' discourse (Figure 11).
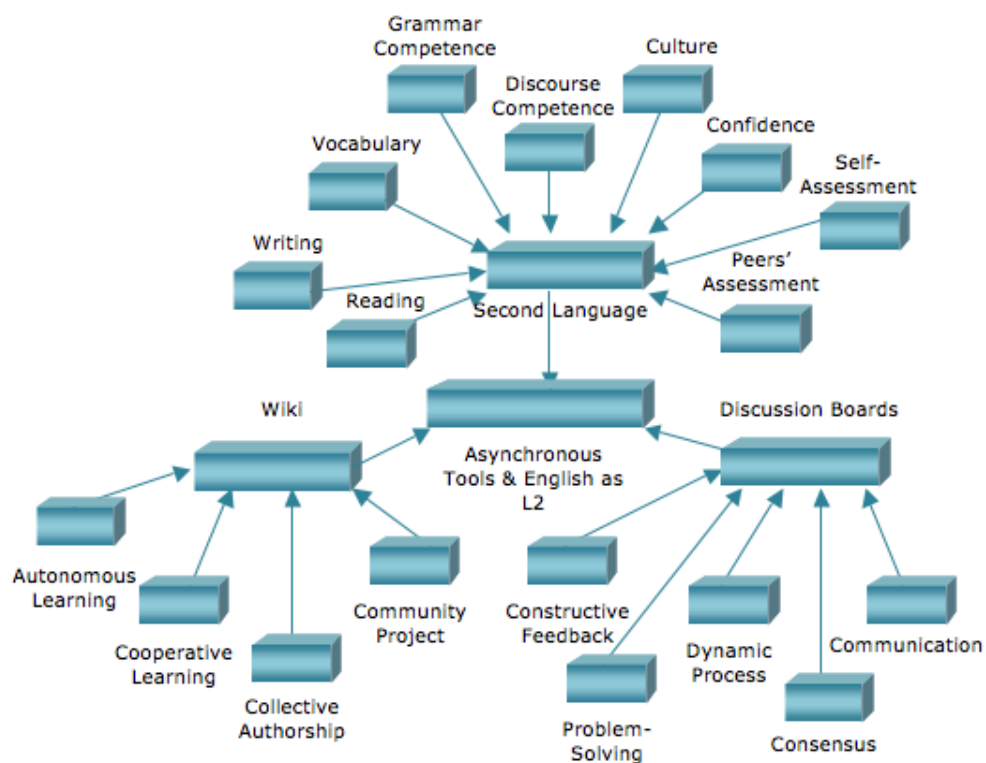


Figure. 11. Conceptual Map
Source: Own work

Researchers decided to apply thematic networks to organize the qualitative data Attride-Stirling (2001). Those thematic networks arranged the coding text in the following levels and their relationships: Global Theme: *Asynchronous Tools and English as L2*; Organizing Theme: *Second language*, *Wiki* and *Discussion Boards*; and Basic Theme: *Second language*: Reading, Writing, Vocabulary, Grammar Competence, Discourse competence, Culture, Confidence, Self-assessment, and Peers' Assessment. *Wiki*: Autonomous learning, Cooperative learning, Collective Authorship,

and Community Project. *Discussion Boards*: Communication, Consensus, Dynamic Process, Problem-Solving, and Constructive Feedback.

The following table (Table 3) includes the qualitative results of the *Global Theme*, *Organizing Themes* and *Basic Themes*.

| Global Theme: ASYNCHRONOUS TOOLS AND ENGLISH AS L2 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| *Organizing Theme: Second Language* | 2753 | 91 | 100% | 19443 | 14% | 14% |
| Basic Theme: Reading | 975 | 66 | 73% | 14242 | 6.8% | 5% |
| Basic Theme: Writing | 897 | 60 | 66% | 13014 | 6.9% | 4.6% |
| Basic Theme: Vocabulary | 220 | 20 | 22% | 4411 | 5% | 1.1% |
| Basic Theme: Grammar Competence | 441 | 40 | 44% | 8747 | 4.7% | 2.1% |
| Basic Theme: Discourse Competence | 1182 | 71 | 78% | 15326 | 7.7% | 6.1% |
| Basic Theme: Culture | 688 | 52 | 57% | 11160 | 6.2% | 3.5% |
| Basic Theme: Confidence | 954 | 62 | 68% | 13324 | 7.2% | 4.9% |
| Basic Theme: Self-assessment | 894 | 62 | 68% | 13214 | 6.8% | 4.6% |
| Basic Theme: Peers' Assessment | 1011 | 65 | 71% | 13891 | 7.3% | 5.2% |
| *Organizing Theme: Wiki* | 6211 | 91 | 100% | 19443 | 32% | 32% |
| Basic Theme: Autonomous Learning | 2329 | 90 | 99% | 19234 | 12% | 12% |
| Basic Theme: Cooperative Learning | 2673 | 90 | 99% | 19228 | 14% | 14% |
| Basic Theme: Collective Authorship | 3126 | 79 | 87% | 17022 | 18% | 16% |
| Basic Theme: Community Project | 2245 | 90 | 99% | 19212 | 12% | 12% |
| *Organizing Theme: Discussion Boards* | 6722 | 91 | 100% | 19443 | 35% | 35% |
| Basic Theme: Communication | 5545 | 91 | 100% | 19443 | 29% | 29% |
| Basic Theme: Consensus | 1021 | 57 | 62% | 12756 | 8% | 5.3% |
| Basic Theme: Dynamic Process | 3244 | 82 | 90% | 17602 | 18% | 17% |
| Basic Theme: Problem-Solving | 1219 | 59 | 64% | 12443 | 10% | 6.3% |
| Basic Theme: Constructive Feedback | 4153 | 90 | 99% | 19123 | 21% | 21% |
| *A = total number of text units retrieved of each subcategory* | | | | | | |
| *B = number of interviews in which participants refer to each subcategory* | | | | | | |
| *C = percentage of the number of interviews in which participants refer to each subcategories in relation to the total number of interviews* | | | | | | |
| *D = number of text units of B* | | | | | | |
| *E = percentage of A in relation to the total text units of the interviews in which participants refer to each subcategory* | | | | | | |
| *F = percentage of A in relation to the total text units (19,443) of all interviews (91)* | | | | | | |

Table 3. Thematic Networks Results

Source: Own work

Based on the overall evaluation of the qualitative data, the majority of pre-service teachers considered that the e-activities provided adequate practices to improve writing skills and the vocabulary related to the topics developed. They also emphasized the opportunity that they had to work about some specific aspects of culture. They believed that these activities helped them to be familiar with some traditions and the history of some countries what it had an influence in their level of the L2, since they considered that culture is part of the learning of a L2. The data analysis also revealed that there was a significant impact of the activities developed on their level of grammar competence, discourse competence and confidence in the L2. The model created a favourable environment for self-assessment and peers' assessment. Participants pointed out that

they could reflect about their contributions and could analyse their improvement. They stated that they had the opportunity to assess their partners' contributions and that everything was done in an environment of respect.

*I had some doubts about the possibilities that we had to improve our skills in the L2. However, after the experience I can really say that we have had many opportunities to improve, especially our writing skills (27-year-old woman, participant 69).*

*The fact of developing wikis around culture has been a good practice to learn different aspects of the culture of the USA and UK (32-year-old man, participant 80).*

*The way in which the activities were designed has allowed us to reflect about our learning and self-assess our improvement and also to assess our classmates contributions (31-year-old woman, participant 4).*

The analysis also provided evidences on the opportunity afforded by wikis activities to promote individual and cooperative learning. Participants stated that they had the opportunity to develop some activities by themselves and to reflect about what they were doing. They considered that this reflection helped them to acquire the skill of learning to learn which is essential to learn and improve in the acquisition of a L2 since the learning of any L2 implies a lifelong learning. A high number of participants stated that they undertook a learning experience in which they had opportunities to work together. They emphasized that the e-activities developed promoted the creation of a community project since these activities involved them in decisions about their contents, style, planning and management. It was created a supportive environment that helped them to develop the e-activities, and reinforced interpersonal skills such as respecting opinions, remaining flexible and appreciating teammates' contributions.

Pre-service teachers emphasized that the use of this tool managed to carry out collective authorship activities in which connected groups of them participated. They reported that all their contributions merged into a collective single work.

*We have participated in an experience in which we could work individually acquiring the responsibility in a task in which we collaborated. It was a more effective learning process (43-year-old man, participant 71).*

*The contributions of all of us led to collective texts developed with the consensus of our opinions (33-year-old woman, participant 57).*

*We were actively involved in the development of the activities; we took decisions and assumed individual and group responsibilities (24-year-old woman, participant 39).*

The highest percentage was obtained in the category that referred to communication. Participants believed that it was essential to have this tool to interact with classmates during the development of the e-activities or when they had some doubts that wanted to share with the rest of the learning community. They especially emphasized that they could communicate accurately and effectively even though they did not share the same place and did not connect at the same time, eliminating all the spatial and temporal barriers. The data also showed that this technological tool afforded

them the opportunities to share an environment in which they could get consensus for the development of the e-activities and could solve the problems that appeared in the development of group e-tasks. They also pointed out that the fact of using this tool made the process more dynamic with many interactions and a flow of ideas or proposals, creating knowledge. Finally, data revealed the benefits of feedback. It was described as an essential aspect to help them to reflect about what they were doing and were learning, and to move forward in their level of English.

*Discussion boards have allowed us to communicate with our project partners as well as to get consensus about the development of the activities and to solve the conflicts that took place (49-year-old woman, participant 79).*
*One of things that I would like to emphasize is the feedback received during the development of the activities on the part of the teachers. I consider that it is essential when we are learning new skills, since we need to know if what we are doing is correct or incorrect (43-year-old woman, participant 35).*

Researchers appreciated gender differences in the different organizing themes emerged from the qualitative data analysis: Second Language, Wiki & Discussion Boards. As Figure 12 shows, there were differences in the Basic Themes of the organizing theme second language that referred to self-assessment, peers' assessment and grammar competence. The results highlighted that women put more emphasis in the aspects that referred to self-assessment and peers' assessment in their interviews. However, men emphasized the possibilities that they had had to improve their grammar competence in the second language. Figure 13, that included the results obtained in the organizaing theme wiki, stresses the differences that existed between women and men in the basic aspects that were related to autonomous learning and collective authorship. In that case, females emphasized more the possibilities that they had had to work by themselves, the autonomous learning, deciding what they needed to practice, when and where to do it, and the times they decided to do it. On the other hand, men put the accent on the opportunities that this asynchronous tool offered them to carry out collective authorship. Finally, figure 14 shows the result obtained in the organizaing theme discussion boards. In that case, the main differences between women and men were in the basic themes about problem solving, consensus and constructive feedback. Women gave prominence to the possibilities that discussion boards offered to them to solve the problems that happened during the development of group activities. They also considered that there were good tools to get consensus to carry out the activities. However, men put more emphasis in the constructive feedback that was created by the participants in these e-activities.

Figure. 12. Gender differences *Organizing Theme: Second Language*
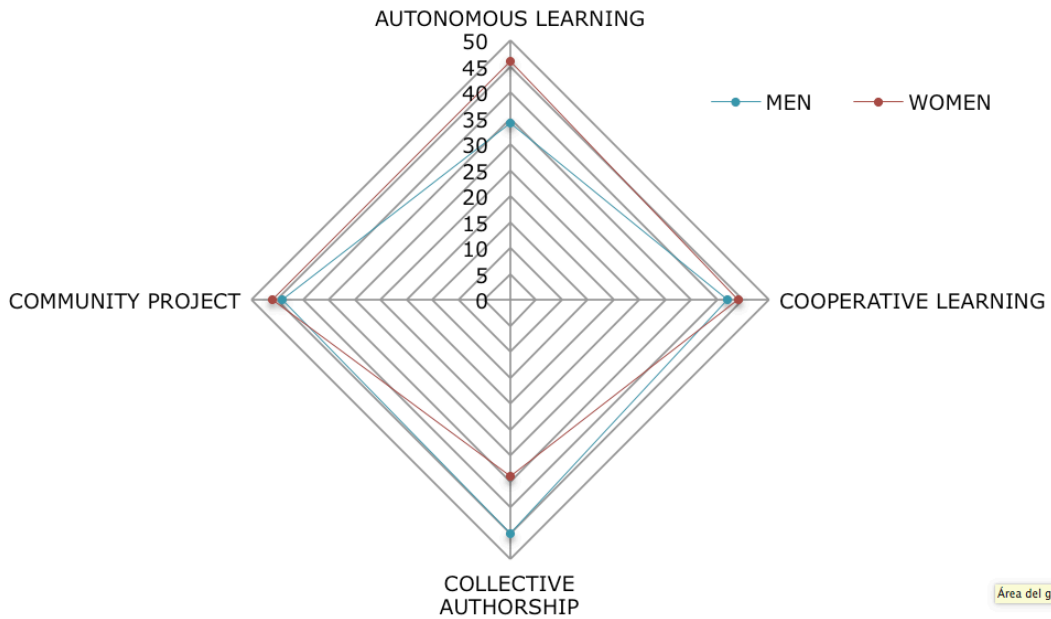Source: Own work



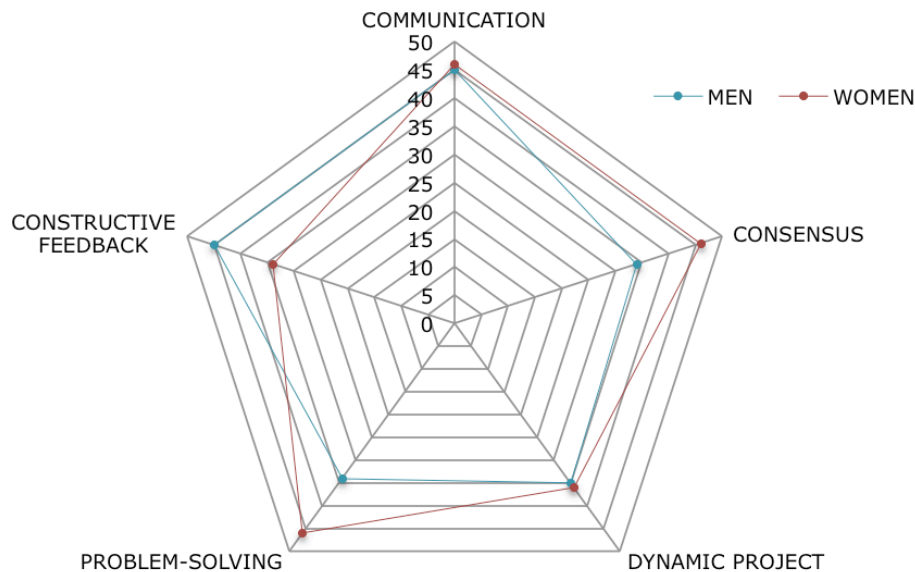Figure. 13. Gender differences *Organizing Theme: Wiki*
Source: Own work

Figure 14. Gender differences *Organizing Theme: Discussion boards*
Source: Own work

Regarding the results obtained in the qualitative analyses, researchers also detected differences between the age groups in some of the basic themes that were part of the organizing themes: *Second Language* (Figure 15), *Wiki* (Figure 16) & *Discussion Boards* (Figure 17). Concerning the organizing theme S*econd Language* there were differences between the youngest participants (20-24 & 25-29) and the oldest ones (30-34 & 35 or more than 35) in the basic themes that referred to *confidence in the second language*, *self-assessment* and *peers' assessment*. The youngest pre-service teachers put more emphasis in the possibilities that the model implemented for the subject English I offered to them to feel more confidence in the second language and in the development of all the assessment activities that they needed to pass along the academic year. They believed that the structure of the course allowed them to self-assess their level in English constinously through the e-activities provided by teachers and to evaluate their classmates' contributions. In the organizaing them Wiki the differences were in the basic themes that referred to autonomous learning and community project. On one hand, the youngest participants (20-24 & 25-29) stressed the possibilities that wiki offered to carry out a project in group even though the participants did not share the same place and did not connect at the same time. On the other hand, the oldest ones (30-34 & 35 or more than 35) the advantage of this tool was the opportunity to work by themselves and support individual leaning. In the last organizing theme *Discussion Boards*, the main differences were in the basic themes related to *dynamic process*, *problem-solving* and *constructive feedback*. In that case, the youngest participants (20-24 & 25-29) highlighted the benefits of discussion board to develop e-activities in a more dynamic way. They described discussion boards as flexible asynchronous tools that promoted their involvement in the teamwork in a totally fluent way. However, the oldest pre-service teachers insisted on the advantages of these asynchronous tools to solve the problem that happened during the development of the group activities. Moreover, they underlined the constant feedback that they received through those tools from teachers and also from their classmates.
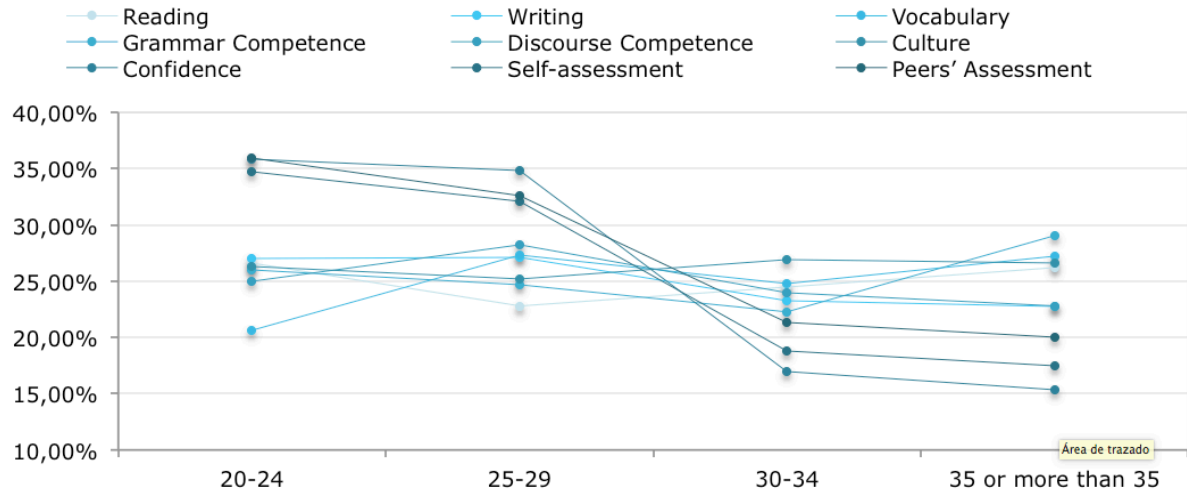
Figure 15. Age differences *Organizing Theme: Second Language*
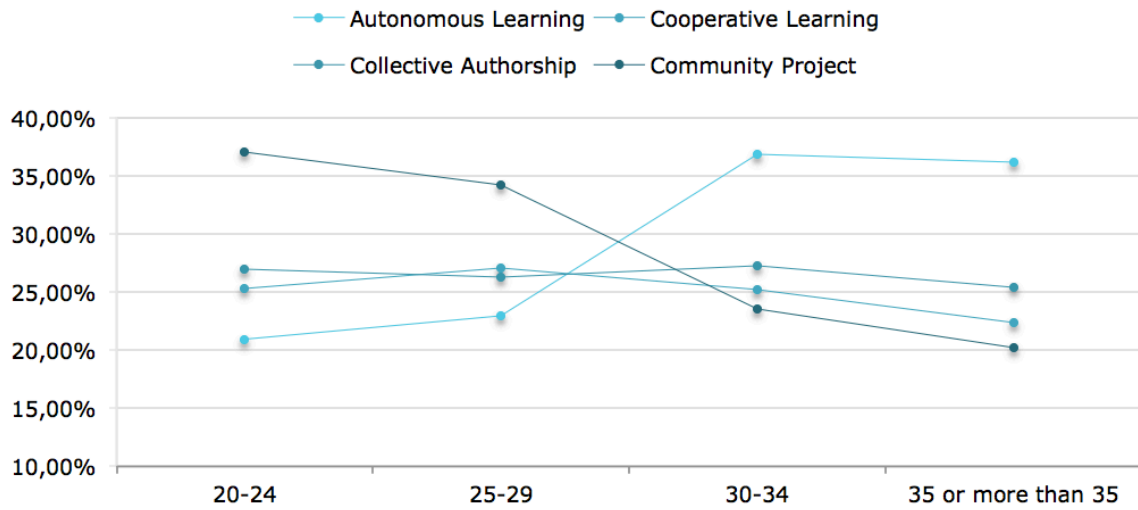Source: Own work

Figure 16. Age differences *Organizing Theme: Wiki*
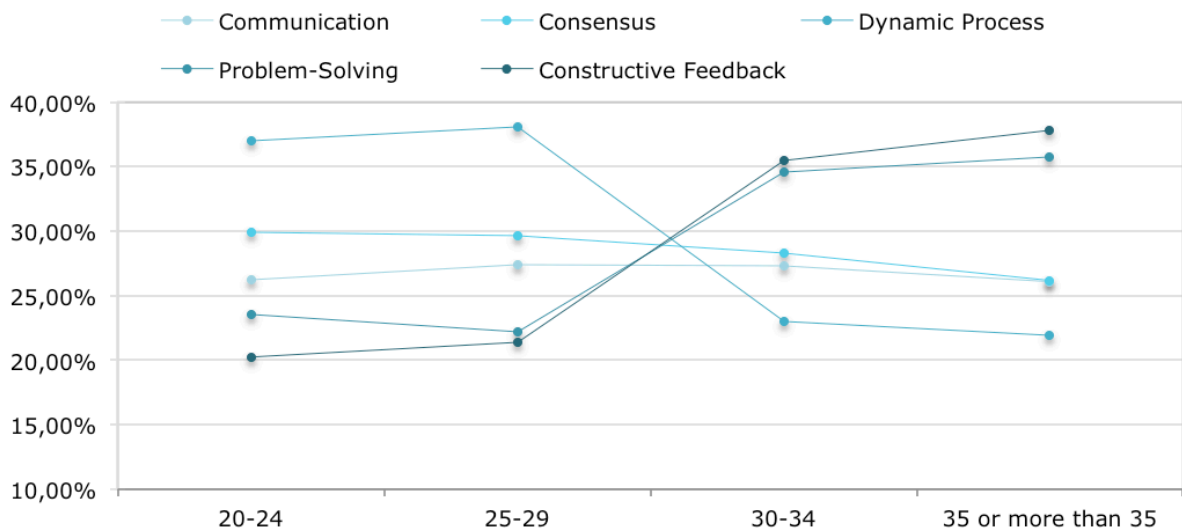Source: Own work

Figure 17 Age differences *Organizing Theme: Discussion boards*
Source: Own work

## IV. Conclussions and Discussion

In this study, results revealed how pre-service teachers perceived that the use of wikis and discussion boards used to develop the e-activities allowed them to improve their writing skills in English, and promoted autonomous and collaborative learning in a B-learning environment. The results also showed how the participants stated that the development of the e-activities helped them to improve other aspects of the second language as English culture, vocabulary, grammar competence and discourse competence (Wichadee, 2013).

Pre-service teachers considered that the group activities developed let them, on one hand, work effectively to create longer collective texts based on their agreements and individual contributions, and, on the other hand, develop better quality texts because these contributions were constantly assessed by the community. The findings also showed how participants highlighted the necessity to reflect and self-assess their level in English. Moreover, they pointed out how that reflection and analysis helped them to persist in learning and to develop the ability to organise their own learning, being aware of their strengths and weaknesses (Pinto-Llorente, Sánchez-Gómez & García-Peñalvo, 2015b; Schellens, 2007). They stressed that although the activities were designed to develop in groups, they also allowed them to work individually, fostering their' autonomy (Kessler, 2010; Pinto-Llorente, Sánchez-Gómez & García-Peñalvo, 2017b).

The results emphasized how participants gave importance to have the necessary asynchronous technological tools in B-learning education to communicate whenever they wanted and wherever they were (Pinto-Llorente, Sánchez-Gómez, & García-Peñalvo, 2014). As they stated, learning implied communication so it was not possible to have success in any kind of education in which that was not taken into account. The results also proved participants' positive opinions about the benefits of having fluent interactions in which they could reach consensus on the ideas they wanted to transmit, and which could help them to solve the conflicts that appeared in the development of the group activities (Miyazoe & Anderson, 2010; Nielsen, 2013).

The results of the study also emphasized participants' positive perpective towards the benefits and effectiveness of the constructive feedback, which helped them to get the objectives of the subject. They pointed out that when they received a positive and constructive feedback, their performance was improved and were more motivated since they felt part of the teaching-learning process (Pinto-Llorente, Sánchez-Gómez, & García-Peñalvo, 2016).
In the current study, researchers demonstrated that the use of a mixed methods research enhanced the validity and reliability of the data obtained, and added rigor to researches in technology and L2. Qualitative and quantitative triangulation is a necessary and a useful resource to carry out this kind of studies.

The findings of the study shed light on the effectiveness of wiki-based activities and discussion boards in the development of pre-service teachers' writing skills (Wichadee, 2013), and their impact on the collaborative autonomy (Arnold et al, 2012; Aydin, 2014) in a blended learning course.

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