COLECCIÓN CONOCIMIENTO CONTEMPORÁNEO

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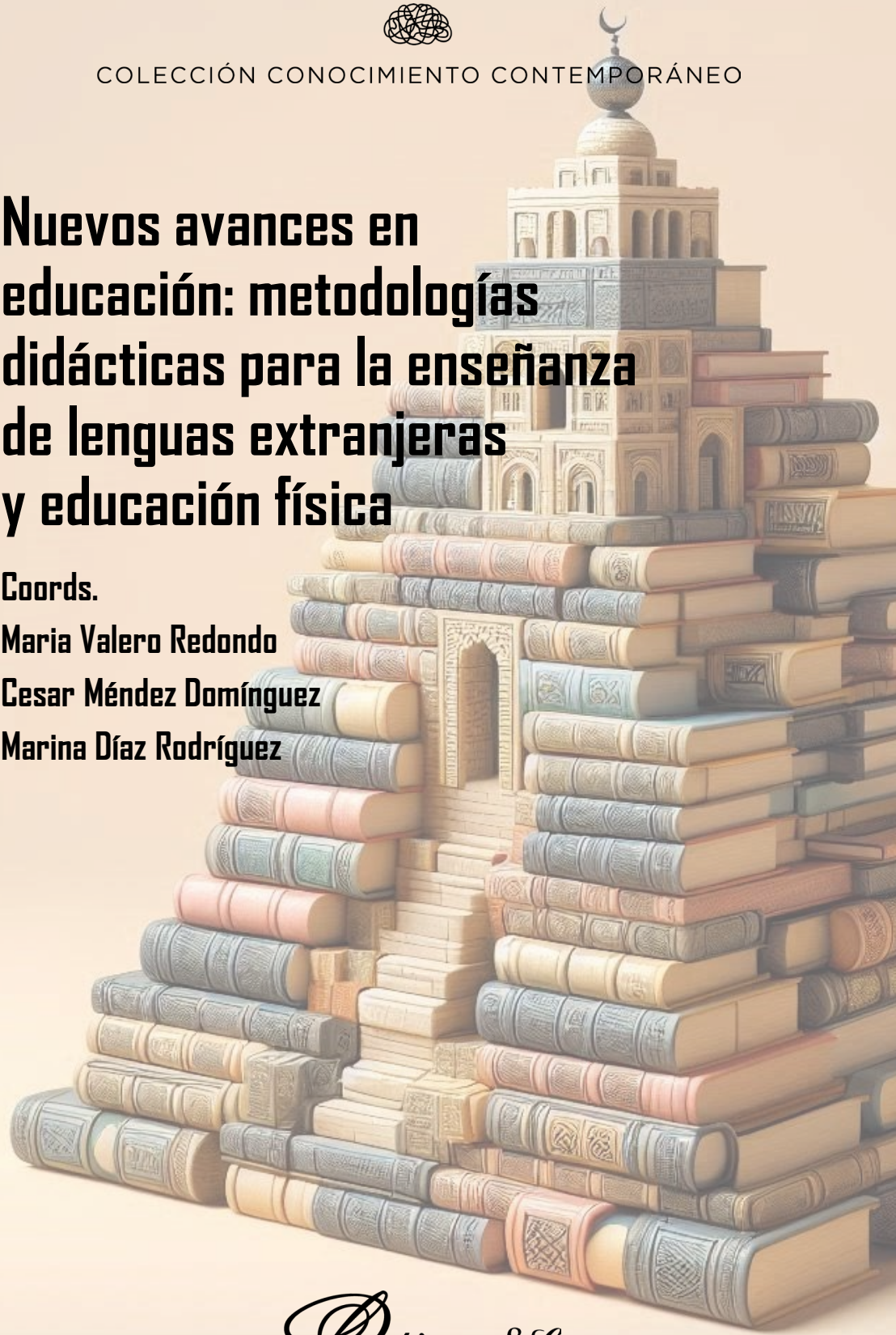

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NUEVOS AVANCES EN EDUCACIÓN: METODOLOGÍAS DIDÁCTICAS PARA LA ENSEÑANZA DE LENGUAS EXTRANJERAS Y EDUCACIÓN FÍSICA

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2024

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METODOLOGÍAS DIDÁCTICAS PARA LA ENSEÑANZA
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INDICE

HARD AND SOFT SCIENCES IN CONTRAST: ESP MEDIATED BY COLLABORATIVE LEARNING (CL) AND COMMUNICATION TECHNOLOGIES (CT)

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1. INTRODUCTION

Collaborative Learning (CL) mediated by Communication Technologies (CT), better known as 'Computer-Supported Collaborative Learning' (CSCL), refers to the instructional strategy of learning and working collaboratively with the support of a computer as a mediating element. More technically, Koschmann (2002, p.20) defines CSCL as "a field of study centrally concerned with meaning and the practices of meaning-making in the context of joint activity, and the ways in which these practices are mediated through designed artifacts" (also Stahl et al., 2006, p.409).

CL mediated by CT has been approached from multiple perspectives. Some studies have focused on genre differences (Cabero Almenara et al., 2016; Kleynhans et al., 2021; also Prinsen et al., 2007), and the description of experiences with the implementation of activities (Cenich & Santos, 2005; Carrió Pastor & Skorczynska, 2015), while others have dealt with the perceptions of CL by students and/or instructors (García-Valcárcel et al., 2012; Álvarez Olivas, 2015). Additionally, students' perceptions of CL have been compared with the perceptions of Autonomous Learning (henceforth AL) (Cabero Almenara & Marín Díaz, 2014; Cabero Almenara et al., 2019; Castro Chao, 2023), and a number of investigations have adopted a multidisciplinary approach (Ibarra Sáiz & Rodríguez Gómez, 2007; Cabañete et al., 2020; Mehta et al.,

2021; cf. Bouso & Arbulú Villanueva, 2023), comparing varied areas of study, including hard sciences (e.g. Mechanical Engineering), mixed sciences (e.g. Environmental Science) and soft sciences (e.g. Primary School Education). The present investigation focuses on an innovative teaching project that examines students' perceptions of CL mediated by CT in an English for Specific Purposes (ESP) context (Dudley-Evans & St John, 1998; Anthony, 2018; Swales, 2000). The approach is multidisciplinary, comparing students' perceptions in the Degrees of Chemical Engineering (CE) and English Language and Literature (ELL) from the University of Santiago de Compostela (USC).

In a post-Web 2.0 era, a variety of digital tools have been explored in CL environments (Brodahl, Hadjerrouit & Hansen, 2011; Chu & Kennedy, 2011; Denton, 2012; Mehta et al., 2021, among many others). For instance, Brodahl, Hadjerrouit and Hansen (2011) present a case study investigating education students' perceptions of collaborative writing using *Google Docs* and *EtherPad*. Similarly, Mehta et al. (2021) explore the use of the platform *Padlet* among undergraduate students from two different disciplines, namely Dentistry and Bioscience. Here we will rely on the cloud-powered tool *Microsoft* (henceforth *MS*) *Office 365*, which is a commonly used tool for collaborative activities in educational institutions (Yadegaridehkordi et al., 2019, p.82).

MS Office 365 represents a suite of institutionally licensed applications, offering a comprehensive array of services including *MS Excel*, *OneDrive*, *PowerPoint*, *Teams* and *Word,* among others. Despite *MS Office 365* being one of the most widely used online productivity tools with collaboration features in education (Yadegaridehkordi et al., 2019, p.81), there are still features that remain to be explored from a multidisciplinary perspective in ESP contexts in which the design of curricula and activities meets the academic and occupational needs of students (cf. Masyhur & Lisia, 2024). For instance, *MS Teams* tools can cater to the demand for engineers to develop skills in computer-mediated communication and teleconferencing (see Kassim & Ali, 2010, p.177; Spence & Liu, 2013, p.97), while *MS Word* tools can assist ELL graduates in collaborative writing for professional purposes such as

research, teaching, editing or translation and interpreting (cf. Klimkowski, 2006; De Jong et al., 2022).

After implementing several *Office 365*-mediated collaborative activities as part of our innovative teaching project, students' perceptions and interests were assessed through a questionnaire. Specifically, the empirical investigation addressed the following research questions (henceforth RQs):

- RQ_1. What is the overall level of satisfaction with the collaborative methodology mediated by *Office 365*, implemented in the Degrees in CE and ELL at USC?
- RQ_2. What is the level of students' interest in lecturers implementing a collaborative methodology in future courses?
- RQ_3. What is the students' perception of Collaborative Learning (CL) mediated by CT as opposed to Autonomous Learning (AL)?
- RQ_4. Is there a significant difference in students' evaluations based on their field of study and gender?

The remainder of the chapter is organised as follows. Section 2 deals with some basic terminology (2.1) and reviews previous literature on the topic (2.2 and 2.3). Section 3 considers the implementation of CL activities mediated by CT in two degree courses, *Technical English* (CE) and *English Language III* (ELL). The methodology of the study is discussed in section 4 and the results are presented in section 5. Last, section 6 provides a summary accompanied by some concluding remarks.

2. BACKGROUND

2.1. Cooperative or collaborative learning?

As noted in section 1, this investigation is based on the implementation of Collaborative Learning (CL) activities mediated by Communication Technologies (CT), specifically using *Office 365* tools. This section aims

to clarify the specific concept of 'collaborative' adopted here, distinguishing it from the notion of 'cooperative' as discussed in the literature.

Generally speaking, there has been a lack of consensus about the precise meanings of the terms 'cooperative' and 'collaborative' (Barkley et al., 2007, p.18). Some authors consider the two terms interchangeable (e.g. Kirschner et al., 2004, p.9-10), while others draw a distinction on an epistemological basis (Bruffee, 1995; Panitz, 1997; see also Barkley et al., 2007, pp.19-20). Panitz (1997, p.5), for example, understands cooperative learning as a set of processes meant to facilitate group interaction directed towards the accomplishment of specific goals, with each student being responsible for a portion of the work (Noguera & Gros, 2009, p.67). Collaborative learning, by contrast, is seen as a personal lifestyle and philosophy of interaction, rather than merely a teaching-learning technique; it involves people respecting each other and emphasising group members' contributions and abilities. Besides, group members not only follow procedures to facilitate group interaction (see García-Valcárcel et al., 2012, p.163) but also share responsibility for the groups' actions, final outcomes and knowledge construction.

Another key difference between cooperative and collaborative learning lies in the role of the instructor. In cooperative learning, the instructor is the one that has control over the learning environment and retains the traditional role of expert and authoritative figure in the classroom, in alignment with a traditional view of knowledge transmission. The instructor takes charge of the preparation and assignment of group tasks, managing time and resources, supervising the learning process and assessing students' task coordination and execution (Barkley et al., 2007, p.18; see also Cranton, 1996, p.27; Castro-Chao, 2023, pp.124-125, among others). Conversely, in collaborative learning instructors and student groups work together to construct knowledge through social consensus, with students assuming greater control and responsibility for the learning process (see Panitz, 1997, p.5; Álvarez Olivas, 2015, pp.16-17). This approach aims to diminish students' reliance on the instructor as the sole authority in knowledge transmission and group coordination (Bruffee, 1995, cited in Barkley et al., 2007, p.19). In essence, while cooperative learning remains teacher-centred, collaborative learning

shifts the responsibility for learning from the teacher to the student, making it more student-centred (Panitz, 1997, pp.1, 5).

2.2. Higher Education students' perception of CL: Hard, mixed and soft sciences

Overall, there is a broad trend in the literature that CL mediated by CT is well-received among Higher Education students (Ibarra Sáiz & Rodríguez Gómez, 2007, pp.364, 369, 374; García-Valcárcel et al., 2012, p.170-172; Ku, Tseng & Akarasriworn, 2013, p.925; Rodrigo Cano, 2016, pp.157, 205; cf. Álvarez Olivas, 2015, pp.260-261). The results suggest further that CL mediated by CT may receive more positive evaluations than AL (Cabero Almenara & Marín Díaz, 2014, p.168; Castro Chao, 2023, p.133; cf. Cabero Almenara et al., 2019, p.52).

As already noted in the introduction, a number of investigations on students' perceptions of CL adopt a multidisciplinary approach (Ibarra Sáiz & Rodríguez Gómez, 2007; Mehta et al., 2021; cf. Bouso & Arbulú Villanueva, 2023), drawing a comparison between varied areas of study. An example is the work by Ibarra Sáiz and Rodríguez Gómez (2007, pp.364-367). This is a study on the evaluations of university students specialising in two soft sciences at the University of Cadiz, which explores differences in the evaluations based on the degree programme (Psychopedagogy and Primary School Education) and on the year of study of participants. The results reveal statistically significant differences between both disciplines, with second-year Primary School Education students (specialising in Special Education) providing evaluations below the overall average (2007, pp.368-369).

Yet another relevant example that adopts a multidisciplinary approach is the one by Cabañete et al. (2020), where the authors explore the students' perceptions specialising in five hard, mixed and soft sciences at the University of Girona: Chemistry and Mechanical Engineering (hard sciences), Business Administration and Management and Environmental Sciences (mixed sciences) and Primary School Education (soft science). Importantly, the implementation of activities does not involve CL in a strict sense; the approach is based instead on cooperative learning (see section 2.1). The analysis shows that, even though the final and

overall assessment is positive in all degrees, students' responses in Mechanical Engineering (hard science) and Business Administration and Management (mixed science) differ significantly from those of students in Primary School Education (soft science). Unlike the study by Ibarra Sáiz and Rodríguez Gómez (2007, pp.364-367) just mentioned, in this case it is Primary School Education students who provide the highest ratings, while Mechanical Engineering and Business Administration and Management students offer the lowest ones (Cabañete et al., 2020, pp.9-13, 14-15). The students of the remaining two disciplines (i.e. Chemistry and Environmental Sciences) occupy a more intermediate position.

2.3. Gender variation in students' perception of CL

The literature offers mixed results regarding gender variation in students' perceptions of CL. Some studies indicate absence of gender differences (Cabero Almenara et al., 2016), while others report significant differences between men and women (Cabero Almenara et al., 2019; Kleynhans et al., 2021; see further Prinsen et al., 2007). This section reviews the results obtained in three of these studies showing opposing views.

Cabero Almenara et al. (2016) investigate the relationship between CL, the use of social media and CT tools and variables such as gender, age and participants' country of study. Data were obtained from universities in Argentina, the Dominican Republic, Spain and Venezuela. Their study reveals no statistically significant differences between men's and women's preference to work collaboratively or individually. Men, however, report higher scores of their technical skills and experience with social media and CT tools. Following a similar approach, the second study, i.e. the one by Cabero Almenara et al. (2019, p.47), examines the perception students have of CL and of the didactic usage of social media. The data utilised encompass multiple engineering programmes in Chile. In this case, the findings reveal statistically significant differences between men and women regarding their learning preferences, with men providing again the highest ratings. The third and last study we will review here is the one by Kleynhans et al. (2021, pp.44-45). It

focuses on the differences between men's and women's experiences with CL based on data collected among Hospitality Financial Management students in South Africa. Results show that, while both men and women are generally satisfied with the experience, there are once again statistically significant differences in the evaluation of specific statements such as "Collaborative learning activities made an important contribution to my learning", and with which men tend to agree more than women (p.45).

3. DESCRIPTION AND PROCEDURE OF THE PEDAGOGICAL PROGRAMME

3.1. CONTEXT OF THE STUDY

As previously noted, the present innovative teaching project was implemented in the Degrees in Chemical Engineering (CE) and English Language and Literature (ELL) from the University of Santiago de Compostela (USC) where several *Office 365*-mediated collaborative activities were carried out in two ESP degree courses: *Technical English* (CE) and *English Language III* (ELL).

Technical English and *English Language III* are both compulsory courses offered in the first semester of the first and second years of study of the CE and ELL degrees, respectively.[16] The main aim of *Technical English* is to help students develop oral and written comprehension and expression skills with a focus on topics related to the field of CE. The course contents and materials correspond to the B1.2 (i.e. B1+) level of the *Common European Framework of Reference for Languages* (CEFR, Council of Europe, 2020). *English Language III* aims to help students develop oral and written comprehension and expression skills, focusing on texts in the formal register and academic context. The contents and materials for this course correspond to the B2.2 (i.e. B2+) level of the CEFR.

[16] The official teaching guides of *Technical English* and *English Language III* can respectively be consulted at < https://tinyurl.com/3vv7yj4n > and <https://tinyurl.com/yw4pevt7>.

3.2. THE DESIGN OF *OFFICE 365*-MEDIATED COLLABORATIVE ACTIVITIES

The *Office 365*-mediated collaborative activities were conducted in groups of four to five participants. In line with a vision of collaborative work that aims to reduce students' dependence on the instructor as the sole authority in knowledge transmission and group coordination (Bruffee, 1995, cited in Barkley et al., 2007, p.19), group members were responsible for forming teams and distributing roles and responsibilities.

The title of the collaborative task implemented in CE is "Presentation of a Failure Analysis via Videoconference" (see Appendix I). It involves creating a description of the potential causes for the failure of a boiler water-wall tube at a fossil fuel-based power station, based on a real case analysed by Liu et al. (2017) (Castro Chao, 2023, pp.127-128, 148-149). Initially, students were provided with a selection of bibliographic resources via *MS OneDrive*, and from reference studies, they identified the concepts and processes involved in the boiler failure. After systematically organising the information asynchronously using *MS Word* (shared document), sketching the nature of the problem and providing a structure for the project, the teams received preliminary feedback. Subsequently, they conducted a supervised synchronous meeting via *MS Teams*, where the students assumed the role of engineers and discussed the problem, the possible causes of failure and the proposed solutions.

The significance of integrating a videoconferencing task in activity design goes beyond the demands of this specific communicative event. According to Kassim and Ali (2010, p.177), teleconferencing is the communicative event in which oral communication skills are most needed for engineers (also Spence & Liu, 2013, p.102-103).[17] In addition, Bourgault and Lagacea (2002) note that, within the realm of engineering, videoconferencing serves as a tool for project management and

[17] The term 'teleconference' is closely connected to 'videoconference' as it involves "[a] meeting or conference at which people in different locations participate by means of telecommunications technology, such as telephones or (in later use usually) videoconferencing equipment or software" (*Oxford English Dictionary*, s.v. *teleconference*, NOUN).

teamwork coordination. Thus, videoconferencing aligns with two pivotal skills in engineering practice, which are inherently collaborative: project management and team building.[18] As Nicholas (2004) points out, project management is an ever-increasing need in the field of engineering and it involves a social side that is often overlooked: project leadership, team building, conflict and stress management (see further De los Ríos-Carmenado et al., 2015, p.186). Likewise, the relevance of project management in CE student training is highlighted in the Degree Report for CE (Spanish Ministry of Education, Culture and Sport, 2015, p.6). This states that students must have the knowledge and skills to organise and manage projects and understand the organisational structure and functions of a project office (CI12; see also CG1, p.5).[19]

The collaborative task implemented in ELL, titled "Development of a Brief Research Project Involving Data Collection Through Questionnaires" (see Appendix II), required students to engage in both written and oral academic discourse following the scientific method within the field of English Studies. Initially, the groups asynchronously selected a topic within their area of expertise, formulated their own hypotheses and/or research questions and searched for relevant information. Synchronously, under the supervision of the lecturer, they quantitatively and qualitatively analysed the data collected via *MS Forms*. Following this, students asynchronously wrote a collaborative text of 2,000-2,500 words using *MS Word* (shared document), making use of *MS OneDrive* for information sharing among group members. Finally, they prepared a 15-minute oral presentation, with each member speaking for three minutes, to be debated synchronously in the classroom. Feedback was provided for both parts of the task (the written and the oral one) by the instructor for each student individually in the rubrics included in the Virtual Campus.

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[18] In engineering, business and technology, 'project management' involves coordinating and integrating the interests, resources and efforts of various stakeholders, along with planning, scheduling and budgeting, to achieve the project's overall objectives (Nicholas & Steyn, 2020).

[19] The Degree Report for the Degree in CE at the USC can be accessed at <https://tinyurl.com/ycxcv4xf>.

The reasoning behind incorporating research-based collaborative activities into the ELL degree program is manifold. First, research is a key ability that ELL students need to develop over the course of their degree studies; as noted in the Degree Report for ELL (Spanish Ministry of Education, Culture and Sport, 2018, p.5), students are expected to develop competences in gathering and interpreting relevant data within their area of study in order to draw conclusions which reflect on relevant issues in society, science or ethics (CB3).[20] Second, undergraduate education in Spain involves the obligatory completion of a Final Year Project (Spanish 'Trabajo Fin de Grado'), and, at a postgraduate level, students may go on to complete a Master's and/or PhD dissertation. Third, research abilities are essential for ELL students not only for academic purposes at an under- and postgraduate level but also for professional integration into research units at public and private institutions, and research centres requiring experimental and data management skills. In spite of this, however, research skills do not always receive enough attention in ESP courses in ELL, which, even if their focus is on formal and academic contexts, they tend to overlook issues of data analysis and scientific inquiry.

4. ASSESSING CL MEDIATED BY CT

4.1. PARTICIPANTS

In this section, we describe the sociolinguistic profile of the sample. The type of sampling used is non-probability convenience sampling, a procedure based on the selection of individuals who are easily accessible (Sabariego Puig, 2009, p.148). The participants were 88 learners of English enrolled in the Degrees in CE (67 students; academic years 2021-2022 and 2023-2024) and ELL (21 students; academic year 2023-2024).

Among the respondents, 47.73% (raw frequency, henceforth rf=42/88) were men and 52.27% (rf=46/88) were women. Concerning their age,

[20] The Degree Report for the Degree in ELL at the USC can be accessed at <https://tinyurl.com/yckt5nc5>.

85.23% (rf=75/88) were aged 17-19, 13.64% (rf=12/88) fell into the 20-23 group and one person was aged 30 (1.14%; rf=1/88). In terms of origin, 95.45% (rf=84/88) are of Spanish nationality—two with dual nationality in the United States and Venezuela (2.27%, rf=2/88)—and 4.55% (rf=4/88) are of French, Italian, Nepali and Portuguese nationalities. Their mother tongue is Spanish in 65.91% (rf=58/88) of cases, 9.09% (rf=8/88) speak both Spanish and Galician, 29.55% only Galician (rf=26/88) and the remaining 4.55% (rf=4/88) have French, Italian, Nepali or Portuguese as their native languages. Last, 92.05% (rf=81/88) indicate that they know English as a foreign language, and 62.5% (rf=55/88) declared to have some type of English language proficiency certificate (level not specified).

4.2. Measuring tools and data analysis

The methodology of data collection draws on an adapted version of the original questionnaire designed by Anderson et al. (2010)—*Social software survey used with unpaced undergrad*—used to determine expertise and interest in social software use in unpaced forms of distance education. An adapted version of the questionnaire has been utilised in CL contexts by Cabero Almenara and Marín Díaz (2014), Cabero Almenara et al. (2016) and Castro Chao (2023), among others. It includes a total of 91 items distributed in seven blocks: 1) 'Identification'; 2) 'Learning Preferences'; 3) 'Technical Skills'; 4) 'Social Software Experience'; 5) 'Social Software for Learning'; 6) 'Confidence in Distance Education Abilities'; and 7) 'Wrap Up'.

For the purposes of the present research, we only used a selection of SS from block 2 ('Learning Preferences'). The selection comprises a total of 15 SS contrasting positive aspects of CL and AL (see our RQ_3). The 15 SS selected were then organised into four thematic blocks (see Tables 1 and 2) dealing with (i) the role of the instructor in organising collaborative work (SS 1 and 10), (ii) the effectiveness and quality of collaborative work (SS 2-5 and 11-12), (iii) the students' preference to work collaboratively (SS 6 and 13-14), and (iv) the students' willingness to interact with peers (SS 7-9 and 15).

To the 15 items originally included in block 2, two more items were added inquiring about students' overall level of satisfaction with and interest in the *Office 365*-mediated activities implemented in *Technical English* and *English Language III* (RQs 1 and 2). The total of 17 items were rated on a five-point *Likert* scale (1='Very low'; 2='Low'; 3='Moderate'; 4='High'; 5='Very high'; cf. Table 1). Responses were collated and subjected to statistical analysis using *IBM SPSS Statistics* (version 28.0.1.1 (14)). The first step was to assess the normality of the data with the Shapiro-Wilk test. Since the data were not normally distributed, we used, first, the Mann-Whitney U test to determine whether the distributions of scores from two independent groups differed significantly (RQ_4), and second, the Wilcoxon signed-rank test to assess the significance of differences in the distribution of scores between two related data sets. Our significance level was set at p=.05.

5. RESULTS

5.1. STUDENTS' OVERALL LEVEL OF SATISFACTION WITH AND INTEREST IN CL MEDIATED BY CT

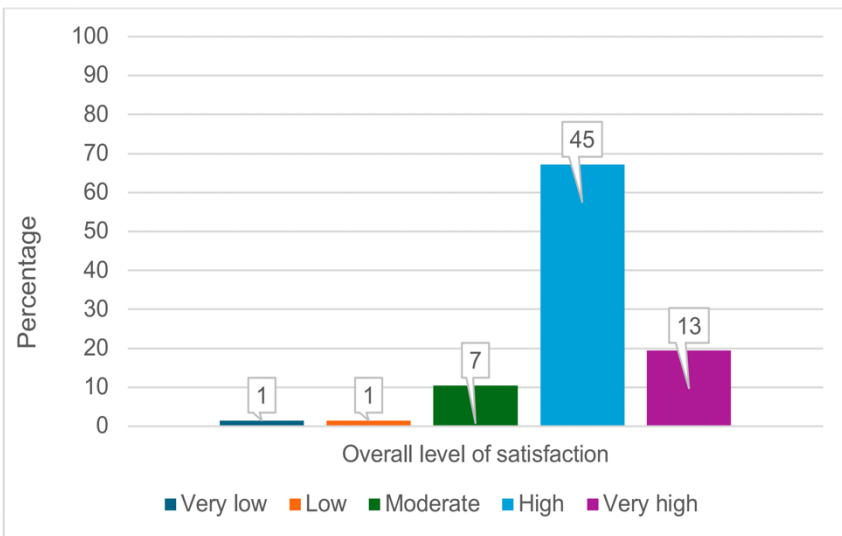
In this section, we first provide an account of students' overall level of satisfaction with the collaborative methodology mediated by *Office 365* (Figures 1 and 2; RQ_1) and of the interest students express in lecturers implementing a collaborative methodology in future courses (Figures 3 and 4; RQ_2).

As can be seen in Figures 1 and 2, the overall level of satisfaction with the collaborative methodology implemented in the degrees in CE (Figure 1) and ELL (Figure 2) is considerably high: 86.57% (rf=58/67) of CE students and 61.91% (rf=13/21) of ELL students rate their overall level of satisfaction as 'High' or 'Very high' on a five-point *Likert* scale (see Cabero Almenara et al., 2019, p.42). The 'Low' and 'Moderate' levels are selected only by 11.94% (rf=8/67) and 38.10% (rf=8/21) of participants, respectively. The results obtained concur with the findings expounded in previous studies which indicate that CL mediated by CT is well-received among Higher Education students (Ibarra Sáiz & Rodríguez Gómez, 2007, pp.364, 369, 374; García-Valcárcel et al., 2012,

pp.170-172; Ku, Tseng & Akarasriworn, 2013, p.925; Rodrigo Cano, 2016, pp.157, 205; cf. Álvarez Olivas, 2015, pp.260-261).

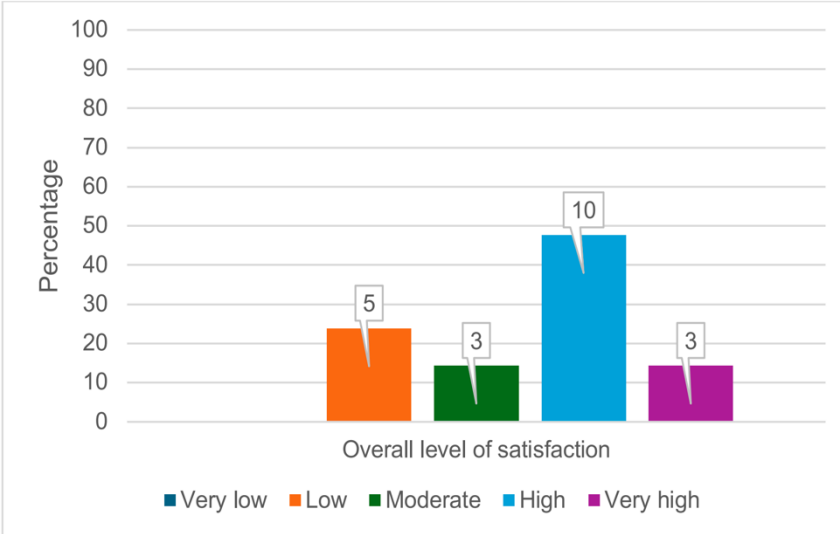
Even though collaborative work is well-received by students of both degrees, CE students are significantly more satisfied with this methodology than ELL students. This conclusion is supported by the results of the Mann-Whitney U test. The mean satisfaction levels, presented here for descriptive purposes, are 4.02/5 (median: 4.00) for CE students and 3.52/5 (median: 4.00) for ELL students. The Mann-Whitney U test, which compares the ranks of the responses, revealed a statistically significant difference in satisfaction distributions between the groups (U=520.50; p=.038) (RQ_4). With respect to gender, no significant differences have been observed between men (mean: 3.86/5; median: 4.00) and women (mean: 3.93/5; median: 4.00) (U=909.50; p=.585). This is in agreement with the results presented in Cabero Almenara et al. (2016, pp.13-14, 18), which similarly found no differences between men's and women's preferences to work collaboratively or individually (cf. Cabero Almenara et al., 2019, p.47; Kleynhans et al., 2021, pp.44-45; section 2.3).

FIGURE 1. *Overall level of satisfaction with the* Office 365*-mediated collaborative methodology implemented in the Degree in CE (percentages and rf)*



Source: Authors

FIGURE 2. *Overall level of satisfaction with the* Office 365*-mediated collaborative methodology implemented in the Degree in ELL (percentages and rf)*



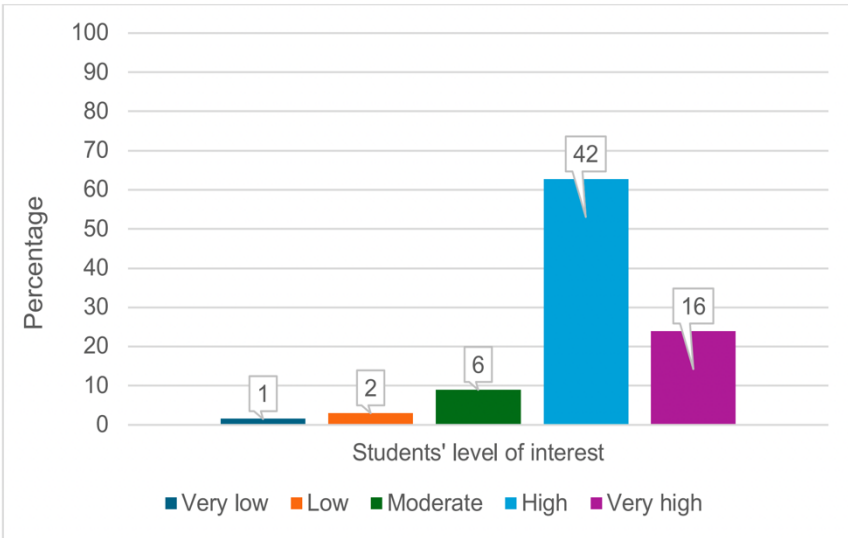
Source: Authors

Figures 3 and 4 display the results on the interest students express in lecturers implementing a collaborative methodology in future courses in CE (Figure 3) and ELL (Figure 4). The percentage of students expressing 'High' or 'Very high' levels of interest is 86.57% (rf=58/67) in CE and 28.57% (rf=6/21) in ELL. The 'Low' and 'Moderate' levels are selected by 11.94% (rf=8/67) and 57.14% (rf=12/21) of participants, respectively. The results align with those presented in Figures 1 and 2 in that, again, the mean for CE students is higher (4.04/5; median: 4.00) than the one obtained for ELL students (2.81/5; median: 3.00); the test applied to identify differences between groups shows that the difference is statistically significant (U=262.50; p<.001). With regard to gender, once again, no significant differences have been observed here between men (mean: 3.93/5; median: 4.00) and women (mean: 3.59/5; median: 4.00) (U=760.00; p=.060).

It is also worth noting that ELL students' mean score for interest (i.e. 2.81/5; median: 3.00) is notably lower than the one obtained in Figure 2 for overall satisfaction (3.52/5; median: 4.00). While the means are presented for descriptive purposes, the Wilcoxon signed-rank test was

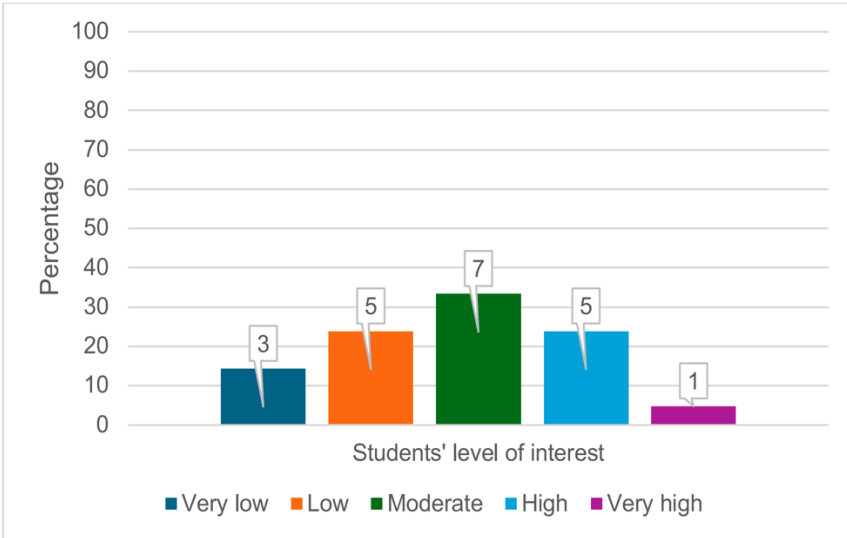
used to assess the significance of differences in the distributions of these two related sets of scores. The test indicated that the difference is statistically significant (W=73.00; p=.005), suggesting that ELL students' interest scores are significantly lower than their overall satisfaction scores. Thus, while ELL students rate the collaborative experience positively with a mean score that falls in the 'High' level of the scale, their interest to use this method in other courses is more limited, falling in the 'Moderate' level of the scale. This may be interpreted as meaning that ELL students perceive the collaborative methodology to be useful in the framework of the specific ESP course in which it was implemented (i.e. *English Language III*, section 3.1) though their perception of the potential benefits of collaborative work in the broader context of their degree studies is less favourable.

FIGURE 3. *CE students' interest in lecturers implementing a collaborative methodology in future courses (percentages and rf)*



Source: Authors

FIGURE 4. *ELL students' interest in lecturers implementing a collaborative methodology in future courses (percentages and rf)*



Source: Authors

Students' overall satisfaction and interest are both significantly higher for the CE degree than for the ELL degree; the results obtained therefore contrast with those presented in Cabañete et al. (2020, pp.9, 14). As pointed out in section 2.2, Cabañete et al. (2020) have observed differences in students' assessment of cooperative learning activities implemented in five Higher Education disciplines. Specifically, they note that the highest ratings come from Primary School Education degrees, while the lowest ones are found in Mechanical Engineering and Business Administration and Management. Assuming that a parallel can be established between CE and Mechanical Engineering—both being branches of engineering—, and ELL and Primary School Education—both having teaching-oriented career prospects—, Cabañete et al.'s (2020) study may be said to differ from ours. This might be due to the fact that their investigation is based on cooperative rather than collaborative activities.

Considering that a conceptual distinction can be drawn between cooperative and collaborative learning (section 2.1), this difference in approach may have acted as a key factor. As previously mentioned, in

cooperative learning the instructor retains the traditional role of expert and authoritative figure in the classroom, and the perspective is more teacher-centred (see Cabañete et al., 2020, pp.2, 14). Conversely, collaborative learning aims to reduce students' dependence on the instructor as the sole authority in knowledge transmission and group coordination, with students taking more control and responsibility for the learning process. Because of this greater emphasis on students' control and responsibility, a collaborative rather than cooperative approach may have led CE students to give more favourable ratings to activities: since collaborative learning implies less instructor intervention and more student involvement in team management, it may be more in line with a professional profile in which engineers are required to acquire skills in project management and team building (section 3.2).

With regard to Cabañete et al.'s (2020) study, it can also be pointed out that higher ratings among Primary School Education students are attributed to the fact that instructors tend to use cooperative learning more frequently in education degrees than in more technically oriented degrees such as Mechanical Engineering. For instance, Primary School Education instructors at the University of Girona traditionally implement cooperative learning activities, in both theory—since the students most likely become teachers—and practice—because students carry out cooperative learning activities planned in the classroom (Cabañete et al., 2020, p.14). In the case of the Degree in ELL at the USC, however, this is only partially the case, mostly because the theoretical orientation of compulsory courses tends to be predominantly philological. Thus, core courses in ELL (e.g. *English Morphosyntax* [second year] or *Literary Theory and Criticism* [first year]) tend to focus on linguistic and literary analysis, while the subjects whose syllabus is centred on teaching-related content (e.g. *Introduction to English Teaching* [third year]) are elective.[21] What this implies is that the Degree in ELL, as its title suggests, is primarily directed towards the analysis of English language

[21] The degree in ELL is divided into four modules, with a total of 240 ECTS credits. This total is composed of 60 ECTS credits of basic training, 120 compulsory ECTS credits, 24 ECTS credits of a supplementary module, 24 ECTS credits of the elective module and 12 ECTS credits of the Final Year Project.

and literature, but the theoretical coverage of teaching methodologies is optional and may be said to play a less central role. This, we believe, might act as another factor affecting ELL students' assessment of CL because it might lead them to perceive that this type of training (i.e. teaching-learning training based on CL) is less central to the theoretical core of their degree studies.[22]

5.2. Students' assessment of CL mediated by CT versus AL

As pointed out in section 4.2, students were inquired not only about overall levels of satisfaction with and interest in CL, but also about their degree of (dis-)agreement with a series of SS contrasting CL and AL (RQ_3). We considered a total of 15 SS organised into four thematic blocks focusing on: (i) the role of the instructor in organising collaborative work (SS 1 and 10); (ii) the effectiveness and quality of collaborative work (SS 2-5 and 11-12); (iii) the students' preference to work collaboratively (SS 6 and 13-14); and (iv) the students' willingness to interact with peers (SS 7-9 and 15). The results are provided in Table 1 and Table 2. The former focuses on CL, the latter on AL.

As can be seen in Table 1, CE students systematically assess SS on CL more positively than ELL students. For instance, S. 1 "An instructor can help most by working with students in teams*" receives mean scores of 3.98/5 (median: 4.00) in CE and 2.90/5 (median: 3.00) in ELL ($U=333.50$; $p<.001$). In the case of S. 9, "Other students like to help me learn*", this receives scores of 3.98/5 (median: 4.00) and 2.57/5 (median: 3.00), respectively ($U=216.00$; $p<.001$). Therefore, the evaluation of SS matches the data presented in Figures 1 and 3 above, since CE students are clearly the ones who assess CL more favourably in 9/9 SS. There are a number of SS, namely SS 2 and 4-5, which stand out in that

[22] The compulsory course *English Morphosyntax* (second year) covers aspects related to the morphosyntax of the English (simple) clause and to the structure and function of its constituent units; in turn, *Literary Theory and Criticism* (first year) deals with topics related to the analysis of narrative, poetic and dramatic texts, among many other issues. In turn, the elective subject *Introduction to English Teaching* (third year) covers various aspects relating to approaches and methods to language teaching (e.g. Task-based approach [TBA], Content-based learning [CBL], etc.), classroom management and lesson planning and evaluation, among others.

they score above 4.00/5 in both degrees, CE (means: 4.26, 4.36 and 4.38/5; medians: 4.00, 4.00 and 4.00, respectively) and ELL (means: 4.10, 4.29 and 4.00/5; medians: 4.00, 5.00 and 4.00, respectively). As no statistically significant differences were attested here, we can conclude that CE and ELL students tend to agree on SS referring to the effectiveness and quality of collaborative work (3/4 SS in thematic block ii): e.g. "We get the work done faster if we all collaborate" (S. 4) or "Working in a team now will help me work with others in the future" (S. 5).

Now, moving on to a more detailed analysis of those SS that show statistically significant differences between degrees (5/9 SS; RQ_4), contrasts have been identified between CE and ELL in all four thematic blocks: (i) (S. 1); (ii) (S. 3); (iii) (S. 6); and (iv) (SS 7 and 9). For instance, S. 6 "I like to work in teams when taking University courses*/**" receives mean scores of 3.76/5 (median: 4.00) in CE and 2.38/5 (median: 2.00) in ELL ($U=250.00$; $p<.001$). In turn, S. 7 "I like to be able to use the ideas of other people*" receives mean scores of 3.88/5 (median: 4.00) in CE and 2.95/5 (median: 3.00) in ELL ($U=367.50$; $p<.001$). Note that the former S (i.e. S. 6) is also the one that obtained the lowest score in ELL, which implies that ELL students, unlike CE ones, may have a certain disdain for collaborative work in Higher Education contexts. S. 6 is, on the other hand, the only one in which gender differences between men (mean: 3.74/5; median: 4.00) and women (mean: 3.15/5; median: 3.00) have been identified ($U=689.50$; $p=.016$); the results accord with those obtained in Kleynhans et al. (2021, pp.44-45) because, even though both men and women are generally satisfied with the experience (Figures 1 and 2), statistically significant differences may be found in the evaluation of specific SS, with men showing higher evaluations than women in S. 6.

TABLE 1. *Students' level of (dis-)agreement with a series of SS on CL*

Nº	Item	CE		ELL		Sig.
		M	Md	M	Md	
1	An instructor can help most by working with students in teams.	3.98	4.00	2.90	3.00	*
2	It is helpful to put together everyone's ideas when making a decision.	4.26	4.00	4.10	4.00	
3	When a team needs something important done, I find it more helpful to work collaboratively rather than alone.	3.73	4.00	2.71	2.00	*
4	We get the work done faster if we all collaborate.	4.36	4.00	4.29	5.00	
5	Working in a team now will help me work with others in the future	4.38	4.00	4.00	4.00	
6	I like to work in teams when taking University courses.	3.76	4.00	2.38	2.00	*/**
7	I like to be able to use other people's ideas.	3.88	4.00	2.95	3.00	*
8	I like to help other people integrate into a work team.	3.85	4.00	3.71	4.00	
9	Other students like to help me learn.	3.98	4.00	2.57	3.00	*
Overall M and Md		4.02	4.00	3.29	3.00	*

M=Mean value on a five-point *Likert* scale from 1='Strongly disagree' to 5='Strongly agree'; Md=Median; Sig.=Significance.

*=Significant differences between CE and ELL students at the p<.05 level.

**=Significant differences between men and women at the p<.05 level.

Source: Authors

Table 2 presents students' assessment of SS on AL. A comparison of Tables 1 and 2 reveals that CE students' overall mean for CL (4.02/5; median: 4.00, Table 1) is much higher than that for AL (2.60/5; median: 3.00, Table 2). ELL students, however, rate CL (3.29/5; median: 3.00, Table 1) very similarly to AL (3.44/5; median: 3.00, Table 2). The differences are statistically significant in CE (W=4886.00; p<.001) but not in ELL (W=3116.00; p=.204).

The statistical analysis of the SS reveals significant contrasts between ELL and CE in 3/4 thematic blocks (4/6 SS): (ii) (S. 11); (iii) (SS 13 and 14); and (iv) (S. 15). In Table 2 ELL students systematically assess such SS more positively than CE students (cf. Table 1). S. 11 "I do better quality work by myself*" receives mean scores of 3.52/5

(median: 3.00) in ELL and 2.55/5 (median: 2.00) in CE (U=337.00; p<.001). S. 13 "I prefer to work by myself so I can progress at my own pace*" receives mean scores of 4.24/5 (median: 4.00) in ELL and 2.58/5 (median: 3.00) in CE (U=182.50; p<.001). S. 14 "I like my work best if I do it myself without anyone's help*" receives mean scores of 3.57/5 (median: 4.00) and 2.70/5 (median: 3.00), respectively (U=391.50; p=.002); and S. 15 "I like to work on my own without paying attention to other students*/**" receives mean scores of 2.71/5 (median: 3.00) and 1.70/5 (median: 1.00) (U=368.00; p<.001), respectively. In addition, S. 15 is the one that obtained the lowest score in CE, which entails that CE students, unlike ELL ones, show little willingness to work autonomously, and tend to feel motivated to interact with peers. Also, in line with our previous results, these findings indicate that ELL students show a stronger preference towards AL than CE students, clearly manifested in S. 13, which receives the highest evaluation of all SS in Table 2 (i.e. 4.24/5; median: 4.00).

TABLE 2. *Students' level of (dis-)agreement with a series of SS on AL*

Nº	Item	CE		ELL		Sig.
		M	Md	M	Md	
10	An instructor can help most when directing the work of each student individually.	3.33	3.00	3.48	4.00	
11	I do better quality work by myself.	2.55	2.00	3.52	3.00	*
12	If I work by myself now I will manage better in the future.	2.76	3.00	3.14	3.00	
13	I prefer to work by myself so I can progress at my own pace.	2.58	3.00	4.24	4.00	*
14	I like my work best if I do it myself without anyone's help.	2.70	3.00	3.57	4.00	*
15	I like to work on my own without paying attention to other students.	1.70	1.00	2.71	3.00	*/**
Overall M and Md		2.60	3.00	3.44	3.00	*

Source: Authors

6. SUMMARY AND CONCLUDING REMARKS

The main goal of the study that we have just presented was to assess students' perceptions and interests in collaborative learning (CL)

mediated by Communication Technologies (CT). After implementing several *Office 365*-mediated collaborative activities in the Degrees in Chemical Engineering (CE) and English Language and Literature (ELL) at the University of Santiago de Compostela (USC), students' perceptions and interest were measured through a questionnaire.

Results show that the overall levels of satisfaction with and interest in the collaborative methodology are considerably high (RQ_1 and $_2$). In this regard, the results obtained concur with the findings expounded in previous studies which indicate that CL mediated by CT is well-received among Higher Education students (Ibarra Sáiz & Rodríguez Gómez, 2007, pp.364, 369, 374; García-Valcárcel et al., 2012, pp.170-172; Ku, Tseng & Akarasriworn, 2013, p.925; Rodrigo Cano, 2016, pp.157, 205; cf. Álvarez Olivas, 2015, pp.260-261). However, students' overall satisfaction and interest are both significantly higher for the CE degree (hard science) than for the ELL degree (soft science) (RQ_4). The results obtained therefore contrast with those presented in a previous study by Cabañete et al. (2020, pp.9, 14) where differences have been observed in students' assessment of cooperative learning activities implemented in five Higher Education disciplines, with the highest ratings coming from Primary School Education degrees (soft science), while the lowest ones are found in Mechanical Engineering (hard science) and Business Administration and Management (mixed science).

With respect to gender, no significant differences have been observed between men's and women's overall satisfaction and interest, just like in Cabero Almenara et al. (2016, pp.13-14, 18), which similarly found no differences between men's and women's preferences to work collaboratively or individually (cf. Cabero Almenara et al., 2019, p.47; Kleynhans et al., 2021, pp.44-45). It is to be noted, nonetheless, that gender differences may be somewhat identified in the assessment of specific SS on CL and AL. Differences between men's and women's evaluations have been attested, for instance, in S. 6, "I like to work in teams when taking University courses", which men rate more highly. In this regard, the results accord with those obtained in Kleynhans et al. (2021, pp.44-45). They similarly find that men and women may be

generally satisfied with the collaborative experience while, at the same time, men may show higher evaluations of specific SS.

Given that CE students consistently rate SS on CL more favourably than ELL students, and that ELL students exhibit a stronger preference for AL than CE students (RQ_3), ESP instructors could enhance ELL students' experience with CL through targeted activities. This might involve integrating key collaborative skills in the professional profile of ELL students, particularly in fields like teaching and translation and interpreting, in which teamwork may be easily incorporated (see Klimkowski, 2006; De Jong et al., 2022). Examples of *Office 365*-mediated activities which simulate teaching and translation-related workplace settings are the following:

- 1) Conducting a videoconference through *MS Teams* in which students coordinate teaching activities at a secondary school.
- 2) Developing a translation project collaboratively using *MS Word*.

As a limitation of the present investigation, we would like to mention that the overall size of the sample needs to be enlarged. This would allow to provide a more comprehensive picture of students' perceptions and interest in CL mediated by CT, and of the factors involved. Additionally, future work on the topic may also want to expand the range of degrees and/or universities (cf. Ibarra Sáiz & Rodríguez Gómez, 2007, p.370; Mehta et al., 2021, p.16).

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APPENDIX I

PRESENTATION OF A FAILURE ANALYSIS VIA VIDEOCONFERENCE (ADAPTED FROM CASTRO CHAO, 2023, P.148-149)

The following situation is considered: you form part of a team of engineers working at the company *GE Steam Power*. As part of this team, you are analysing the potential causes of the failure of a boiler water-wall tube at a fossil fuel-based power station. In groups of four-five students, you should create a collaborative project in a virtual environment following these three steps:

1. Read the article by Liu et al. (2017) (available in *MS OneDrive*), in which the possible causes for the thinning and subsequent rupture of a boiler water-wall tube are presented.*
2. Elaborate a collaborative document (*MS Word*) in which you sketch the nature of the problem, the possible causes of failure and the proposed solutions. In this preliminary document, you should also provide a structure for the project.
3. Hold a videoconference call in *MS Teams* (15-20 minutes, on the time and date scheduled by the lecturer). Based on the collaborative document you have prepared, the purpose of this call is to emulate a real-life meeting where a group of engineers discuss the problem, the possible causes of the failure and the proposed solutions to the failed boiler, with the aim of improving the design and development of boilers at *GE Steam Power*.

The meeting should be coordinated, coherent and structured; to help you organise the videoconference, you are advised to assign a meeting host (i.e. a person who schedules the meeting and is in charge of running it). In order to coordinate the task in a virtual environment, make use of any of the applications available in *Microsoft Office 365* (*MS Outlook*, *MS Planner*, *MS Teams*, *MS 365 Groups*, etc.).

* For further information about the possible causes for the failure of boilers, consult the complementary bibliography available in *MS OneDrive*.

LIST OF USEFUL EXPRESSIONS WHEN HOSTING A VIDEOCONFERENCE CALL:

Thanks for being here on time / *Let's get started then* / *The purpose of today's meeting is.../ I wanted to go over a couple of...* / *Sorry I'm late. I had a hard time connecting* / *One second, Maria is having a sound issue* / *Try adjusting your output settings. It's the gear icon* / *Nevermind, I got it. I just had to change a few settings* / *I think it's your mic. Do you have headphones?* / *I had to download a new version of the platform* / *You should plan extra time for the updates. There's pretty much one every time* / *Sounds like someone just joined* / *We lost Kevin I think* / *I know some of you have to leave soon* / *Hang on, I'm gonna join in* / *What platform are you guys on?*

(Source: elaborated by the author based on real-life and recorded videoconference calls)

APPENDIX II

DEVELOPMENT OF A BRIEF RESEARCH PROJECT INVOLVING DATA COLLECTION THROUGH QUESTIONNAIRES

During the semester several activities will be conducted in class in order to improve your linguistic and research skills, in addition to promoting your autonomy and critical thinking. Your task is to write about a particular topic complying with the rules of academic discourse and defend that project orally, demonstrating your proficiency in linguistic and research skills, as well as autonomous and critical thinking. The target level, as mentioned in the teaching guide, is a B2.2 level according to the CEFR.

FORMAT AND LENGTH

Oral presentation in **teams of four to five students (15 minutes in total**, around three minutes per person) and written version of the project. The article / chapter you will have to write should have an extension of **2,000-2,500 words** (500 words per student approximately, i.e. eight pages, using Times New Roman, size 12, double-spaced; references excluded).

This page (http://wordstopages.com/) can help you calculate the number of pages, depending on the style you use. In the folder where these guidelines are included, you will also find a **template** (in Spanish) that I created to give you an idea of what I expect from you at this level in terms of style. You can use that template for the written version of your project; it is optional though and remember that the headings should be in English (feel free to translate them and modify the number of headings for the purposes of your own project). **Please, include the word count** (excluding references). If your project **slightly** exceeds the word limit, such as by 15% of the total, it is acceptable.

PREPARATION FOR THE PROJECT

For the collaborative activity, you will have to prepare a written version and deliver a 15-minute presentation on a topic within **your field of expertise or personal interest.** I suggest you pick one you feel passionate about and that is amenable to be studied empirically (i.e. you can test an idea and assumption by conducting a survey).

In class, we will debate or brainstorm different topics to stimulate your critical and creative thinking skills. We will also review aspects concerning the preparation and presentation of reports, as well as the correct use of elements of cohesion and textual organization. I will also help you develop a number of competencies related to research (e.g. gathering information and managing resources, hypothesis formulation, description and interpretation of the results, among other aspects.)

Autonomously, you should **delimit** the research topic you, as a group, have decided to focus on. You should also organise and distribute the tasks, **formulate** your own hypotheses and/or research questions, **search for** relevant information, select your materials and **analyse** YOUR data. As a final step you should also **write a SCRIPT** that incorporates the results of the investigation, as well as **create relevant graphic material** (images, videos and figures).

To help you prepare for the oral presentation, I have included in this very same folder an example of a script of my own (I used, in fact, this script for a 15/20-minute presentation in an online conference). NOTE, however, that only a **layout** of the main ideas can be held during your

performance, that is, *you cannot read off the page* entirely, and that the use of **visual support** is highly recommendable. Finally, you should bear in mind the **techniques** covered in class for planning and delivering effective presentations.