Collaborative international online learning for the development of intercultural awareness: an experience with pre-service language teachers

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Abstract

Purpose – Considering the potential of Collaborative International Online Learning (COIL) for cross-boundaries interacting and collaborating effectively, this study aims to explore the intercultural awareness of pre-service language teachers after participating in a COIL project.

Design/methodology/approach – Following a quantitative research approach and an exploratory cross-sectional method, the authors administered a 13-item questionnaire to unveil the perceptions of 64 future language teachers from Spain after their online experience with counterparts from the USA.

Findings – Participants consider that COIL may have enhanced their intercultural and global awareness and equipped them with valuable skills and knowledge for the future, being women more positive than men. Moreover, the results also suggest that those participants who have not traveled abroad consider COIL to be a good opportunity to compensate for the lack of knowledge or experience with other cultures resulting from not having had the opportunity to visit other countries.

Practical implications – COIL needs to be seen as a powerful tool to promote global learning, intercultural understanding and the development of skills among students that will be vital for success in today's interconnected world. Nevertheless, universities and teacher training centers need to rethink the preparation of future teachers for the increasing demands to prepare students for the requirements of the global world, and to do so, they need to consider that COIL may offer them significant benefits.

Originality/value – This work offers an interesting exploration of teachers' attitudes toward COIL, providing insights into the potential of online collaboration for developing intercultural awareness.

Keywords Collaborative international online learning, COIL, Intercultural awareness, Quantitative research, Pre-service teachers, Teachers' attitudes

Paper type Research paper

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Introduction

Today, educational institutions are increasingly demanded to prepare students for the requirements of the global world (Oxford University Press, 2021). In this sense, technology and the development and internationalization of innovative curricula are seen as critical in achieving this goal (Fox, 2019; Moore and Simon, 2015), as they provide both students and teachers with opportunities to acquire and develop global skills. In this line, virtual cross-cultural experiences have become valuable when it comes to offering accessible, cost-effective and useful linguistic and intercultural opportunities to learners, who are encountered with chances to meet international fellow students, learn from their cultures and start beneficial relationships (Ceo-DiFrancesco, 2015; Ottoson, 2022). Such virtual exchanges have been proven to not only support personalized student-led learning but also enrich their understanding of other cultures (Masterson, 2020) and more quality teaching and learning processes (Louahala, 2023), which explains why they have become a growing classroom trend in recent years, especially since the pandemic (Colpaert, 2020; O'Dowd, 2021).

At this juncture, Collaborative International Online Learning or COIL (also known as globally networked learning, global connections, virtual mobility and telecollaboration; Rubin, 2017) has become critically important today due to the forces of globalization, technological advancements and, undoubtedly, the impact of the COVID-19 pandemic (Beelen, 2022). According to Collett *et al.* (2023), COIL:

> [...] is an educational approach that fosters cross-cultural collaboration and learning among students and faculty. It involves bringing together individuals from different cultural backgrounds to participate in shared learning, discussions, and collaborative activities within the context of their academic courses. Faculty collaborate to design the COIL experience, while students work in partnerships to engage in the designed activities. (p. 3)

COIL allows the participation in global teaching and intercultural learning through international collaboration at "home" (Gokcora, 2021). Nevertheless, as any other educational intervention, these virtual experiences also need proper and careful planning. According to SUNY COIL Center (2023), any COIL experience should entail four phases, namely,

(1) team building, in which a series of icebreakers, discussions and activities are used to help students get to know their international project mates and make them comfortable enough to work online and with other cultures;

(2) organization phase, whose aim is to prepare for what is to come in the collaborative project work, including team making;

(3) project phase, which is focused on the activity designed for the collaboration; and

(4) presentation phase, in which the completed work is shared, and including a reflection on the content of the project and the cultural aspects of the collaboration.

Among its multiple benefits, COIL can enrich the learning process by equipping students with the necessary skills to collaborate across borders and understand diverse cultures (SUNY COIL Center, 2023; Goodwin, 2020). Moreover, COIL can also promote social justice (Slapac *et al.*, 2023) and helps learners develop global awareness and become responsible citizens as it promotes culture-related abilities (Guimarães and Finardi, 2021; Hackett *et al.*, 2023; Kerkhoff *et al.*, 2021). It can also facilitate the access to educational resources from around the world and support collaborative problem-solving for issues of global importance (Adefila *et al.*, 2021; Lu and Smiles, 2022; Zhang and Pearlman, 2018), thus promoting

lifelong learning. Ultimately, COIL is instrumental in preparing individuals for success in a rapidly changing, globalized society.

In the case of language education and under the umbrella of computer-assisted language learning or CALL (Tafazoli *et al.*, 2019, 2020), language classrooms have also witnessed the irruption of technology-based teaching and learning options that facilitate virtual interactions among students and enhance the significant potential that COIL bears. In this sense, this type of telecollaboration offers an innovative approach to language learning, as students face virtual interactions with peers from different and distant parts of the world with diverse linguistic backgrounds. In COIL projects, not only can students practice their target language in authentic and real-world-like situations (Huertas-Abril and Palacios-Hidalgo, 2023; Villegas-Troya *et al.*, 2023) but they can also gain exposure to diverse cultural perspectives (Hackett *et al.*, 2023; Collett *et al.*, 2023). This collaborative approach, when applied to language education, can certainly help students become more proficient speakers for the interconnected world of the present and, eventually, more prepared for the demands of the globalized society.

Focusing on the cultural assets of COIL, several studies have pointed out that this type of virtual collaborative experiences may enhance the development of students' intercultural competence and awareness (Katre, 2020; Slapac *et al.*, 2023) as indeed COIL enables language learners to break down geographic barriers, creating a global classroom that promotes communication and collaboration across different cultures. Although it is true that most COIL partnerships encounter challenges such as technological limitations and time constraints, research consistently shows that students who engage in COIL experiences value them for their contributions to intercultural sensitivity, collaborative international learning, and the use of technology for global connections. For instance, Muñoz-Escalona *et al.* (2022) found that COIL activities enhanced students' global understanding while also promoting intercultural competences and international perspectives, and so did Ramírez-Marín *et al.* (2020), who highlighted how COIL fostered not only a reflection on language learning but also on cultural understanding, as well as the development of intercultural skills. Similarly, Kayumova and Sadykova (2016) highlighted the positive perspectives of students who participated in a cross-cultural online project, emphasizing the value of collaboration and cultural exchange. Furthermore, in a qualitative case study conducted with Chinese foreign language learners, Huang (2023) found that COIL activities facilitated the development of intercultural communication competence, especially in terms of increased understanding of cultural differences and similarities, awareness of cultural heterogeneity and tolerance and open-mindedness to foreign concepts and cultural norms. Morsi and Assem (2021) investigated learners' achievements in a COIL experience in the context of Egyptian higher education and revealed better performance in online environments as compared with face-to-face instruction and that women outperformed men, thanks to their better communication skills and online presence in online courses, showing the effect of gender on COIL. Similarly, Huertas-Abril and Palacios-Hidalgo (2023) also unveiled gender-based differences between men and women when studying the impact of COIL on teachers' digital skills.

Research has also shown the potential of COIL in initial teacher training, as it is a powerful tool to bring attractive and globally relevant learning experiences to the classroom (Quintana-Ordorika *et al.*, 2023; Slapac *et al.*, 2023). Be that as it may, it still seems pertinent to explore the perceptions of future teachers regarding the educational benefits of COIL, especially with regard to the development of learners' intercultural skills.

Methods

Research design

As stated in the previous sections, the internationalization of the curriculum provides both students and teachers with opportunities to advance their global competences, whereas online technology, telecollaboration, virtual mobility and COIL enable them to cross-boundaries, interacting and collaborating effectively (Goodwin, 2020; Guimarães and Finardi, 2021; Hackett *et al.*, 2023; Kerkhoff *et al.*, 2021). In this context, this quantitative research aims at exploring pre-service teachers' intercultural awareness, especially related to a CALL process, after having participated in a COIL project. This research follows an exploratory cross-sectional method, examining the current situation of an issue within a population at a specific moment (Adèr and Mellenbergh, 1999), as well as an interpretative approach, with the aim to comprehend and elucidate the viewpoints of the participants (Schwartz-Shea and Yanow, 2012).

Objectives and hypotheses

This paper aims at analyzing pre-service language teachers' intercultural awareness from a Spanish university after participating in a COIL project with an American university, as part of a CALL process. Moreover, two secondary objectives are also posed:

(1) to explore whether gender is a determining factor in pre-service language teachers' perception of their intercultural awareness after having participated in a COIL project; and

(2) to analyze whether having previously international experiences abroad has any impact on pre-service language teachers' perception of their intercultural awareness after having participated in a COIL project.

Three hypotheses are posed in this research based on previously revised scientific literature in the field of educational technology, CALL and COIL and on the researchers' assumptions (Table 1):

Hypotheses	Motivation
Hypothesis 1 (*H1*): Pre-service language teachers have a positive attitude regarding how COIL experiences can improve their intercultural awareness when integrated into CALL processes	Based on the results of studies that prove that COIL is beneficial for students' intercultural skills (e.g. Katre, 2020; Muñoz-Escalona *et al.*, 2022; Ramírez-Marín *et al.*, 2020)
Hypothesis 2 (*H2*): There are significant differences concerning the perceptions of pre-service language teachers regarding COIL in terms of gender	Based on the results of studies that show gender-based differences in students' perceptions when implementing COIL and online collaboration (e.g. Huertas-Abril and Palacios-Hidalgo, 2023; Morsi and Assem, 2021)
Hypothesis 3 (*H3*): There are significant differences concerning the perceptions of pre-service language teachers regarding COIL depending on whether they have previously traveled abroad or not	Based on the assumptions that participants who have traveled abroad may have improved intercultural awareness, and that participants who have not may find in COIL an opportunity to increase their experience with people from other countries and cultures

Source: Authors

Table 1.
Hypotheses of the study and motivations

Participants

A nonprobabilistic sample based on convenience was used for the selection of the participants ($n = 64$). All the participants were selected through purposive sampling techniques considering their potential for selecting an accurate, relevant and cost-effective sample, thanks to participants' knowledge of the research topic (Mertens, 2014). In this sense, eligibility criteria were based on proximity and participation in a COIL project between the University of Córdoba (UCO), Spain, and the University of Missouri-St. Louis (UMSL), USA, developed in the Spring Semester of the academic year 2022/2023. This study will focus only on the Spanish institution.

The COIL project took place in the third-year course "English as a Foreign Language for Primary Education Teachers," a compulsory subject of the Degree in Primary Education and the Double Degree of Primary Education and English Studies. A total of 64 pre-service teachers took part in the study. In terms of gender, 78.1% of the participants ($n = 50$) identified themselves as women, whereas 21.9% ($n = 14$) identified themselves as men; no respondents identified themselves as nonbinary, so only binary genders (i.e. man and woman) were considered in this study. All the participants were in the age range of 18–25 years old. Moreover, 93.8% of the participants ($n = 60$) had traveled internationally to other countries, whereas 6.3% ($n = 4$) had never traveled abroad.

All the participants used their mobile devices and smartphones following the BYOD principle, that is, "an individual makes use of their personally-owned technological device [. . .] in a workplace or educational setting, rather than using an institution-owned device, to perform work or education related tasks" (Clark *et al.*, 2021, p. 255). During the two-month COIL project, the students were engaged in the use of educational technology to facilitate the virtual mobility, so that they could exchange their teaching experiences at the same time they developed their language skills and their intercultural awareness. Besides, the training was supplemented with online resources, which included videos, online tutorials and internet links using the UCO Moodle platform.

Instrument

The "Collaborative International Online Learning (COIL) - Student Survey Questions" (Collett *et al.*, 2023), adapted from the Global Learning Experience (GLE) Student Survey Questions developed by DePaul University (2023), was used to collect the data. The questionnaire consists of an initial demographic data section and 12 items expressed in a five-point Likert scale (1 = strongly agree; 5 = strongly disagree) and 1 item (Q13) with a different five-point Likert scale (1 = delighted; 5 = not satisfied at all). It was distributed online via Google Forms (https://bit.ly/3M5uyyh) using the UCO Moodle platform and administered in English. Before answering the questionnaire, participants were informed about the objectives of the study and the exclusively research nature of the usage and storage of the data. Participants gave their consent and were informed about the possibility of withdrawal from the study at any time. Data were gathered between May and June 2023, when the UCO-UMSL COIL project had finished.

Procedure: the Collaborative International Online Learning project

The COIL project was designed by faculty members of the two participant universities, UCO (Spain) and UMSL (USA). To facilitate the virtual exchange, the Flip platform was used. The objectives of the COIL project were:

- to explore cultural diversity through COIL;

- to develop an action-research study related to teaching in diverse and global classrooms and multicultural learning environments; and
- to share local challenges and local and global solutions to educational practice with international peers through video and reflections.

For this purpose, three stages were followed:

(1) Stage 1. Think about a problem/controversial issue/limitation that you have found when teaching at school. After your brainstorming process, write down the outline/main notes for your video. You will have to upload the outline/notes onto Moodle. Record a short video (3 min maximum) using Flip with the following parts: (i) introduce yourself (your name, what you study, role in your school, grade and teaching level or content area and main interests related to education); (ii) describe the problem/controversial issue/limitation that you have found when teaching at school; and (iii) pose at least one question about your topic.

(2) Stage 2. Watch at least two videos of your counterparts from the other university and answer their questions using Flip. At least one of the answers must be a short video (to avoid unbalanced situations, we will assign you your two videos, and which one must be compulsorily a video answer).

(3) Stage 3. Give your feedback about the tasks in Flip in our COIL experience.

Data analysis

The data obtained with the questionnaire were analyzed using SPSS V25.0 for MacOS. To test whether the sample followed a normal distribution, Shapiro–Wilk test was applied considering the size of the sample. As the level of significance was $p < 0.05$ in all cases, the sample was assumed to follow a nonnormal distribution (Koh and Ahad, 2020). The nonnormal distribution and the limited number of participants led the authors to apply nonparametric tests (Mann–Whitney U and Wilcoxon W) to explore statistically significant differences among respondents in terms of gender and experiences abroad. Cronbach's alpha was calculated to test the validity and internal reliability of the instrument. The result was $\alpha = 0.887$, which proves the reliability of the questionnaire (Taber, 2018).

Findings

Descriptive results

The percentage of participants' responses per item according to the Likert scale as well as the mean scores and standard deviations of the items of the questionnaire are shown in Table 2 below.

As shown in Table 2, the participants show a generally positive perception of the COIL project, as well as of how COIL has provided them with an opportunity to increase their intercultural competence and global awareness. In this line, participants agree or totally agree with the facts that the COIL component of the course introduced them to a new outlook and new ways of thinking about how they relate to the world (Q01), has made me more globally aware (Q02), has provided them with skills and knowledge useful for the future (Q04) and has increased their interest in further opportunities for international cultural exchanges (e.g. studying abroad, engaging their learners in international learning online) in the future (Q12). Together with these positive results and impact of the COIL

Item	N	% 1	2	3	4	5	M	SD
Q01	64	34.4	*43.8*	12.5	6.3	3.1	2.00	1.008
Q02	64	32.8	*51.6*	7.8	6.3	1.6	1.92	0.896
Q03	64	15.6	*34.4*	32.8	12.5	4.7	2.56	1.052
Q04	64	*40.6*	28.1	17.2	12.5	1.6	2.06	1.111
Q05	64	12.5	7.8	15.6	29.7	*34.4*	3.66	1.359
Q06	64	10.9	17.2	*39.1*	15.6	17.2	3.11	1.210
Q07	64	31.3	*43.8*	18.8	4.7	1.6	2.02	0.917
Q08	64	*59.4*	21.9	12.5	6.3	0.0	1.66	0.930
Q09	64	*62.5*	23.4	9.4	3.1	1.6	1.58	0.905
Q10	64	*56.3*	25.0	14.1	1.6	3.1	1.70	0.987
Q11	64	28.1	29.7	*34.3*	3.1	4.7	2.27	1.058
Q12	64	*43.8*	39.1	10.9	3.1	3.1	1.83	0.969
Q13	64	40.6	*43.8*	10.9	3.1	1.6	1.81	0.871

Notes: In items Q01–Q12, 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree; in item Q13, 1 = delighted, 2 = satisfied, 3 = neutral, 4 = little satisfied, 5 = not at all satisfied. In italic the highest values
Source: Authors

Table 2.
Descriptive statistics per item

project, the participants felt prepared to deal with the cultural aspects of virtual mobility (Q07) as well as the technology demands of the COIL component of the course (Q08), and they considered that the technology chosen felt appropriate for the needs of the experience (Q09). Furthermore, 81.3% of the participants would recommend a course with a COIL component to other students (Q10), and 40.6% felt delighted and 43.8 satisfied with the COIL experience (Q13). Moreover, 50% of the participants ($n = 32$) responded that the COIL component of this course has changed their perception of another culture or country. Similarly, although the mode of Q11 ("I would choose a course that included a COIL component over a course that did not") is "neutral", 57.8% ($n = 37$) "agree" or "totally agree" would prefer having COIL projects in their courses.

Nevertheless, participants feel "neutral" regarding the statement that COIL may affect their career/career choices regarding where they decide to teach in the future (Q06). Finally, the item with the highest score and with "strongly disagree" as the mode is Q05 ("Through the COIL component of this course I made connections with international students that I will maintain beyond this course").

Differences regarding gender

Considering the distribution of the sample is not normal, Mann–Whitney U and Wilcoxon W tests were applied to the 13 items to determine whether there are statistically significant differences among the respondents according to their gender, and the results are shown in Table 3 below.

Statistically significant differences ($p < 0.05$) were only found in two of the items (Q02, "The COIL component of this course made me more globally aware," and Q10 "I would recommend a course with a COIL component to other students"), being women who scored lower in both items. Moreover, it must be noted that women tend to score lower than men in most of the items, showing then a better attitude, except for item Q06 ("This COIL may affect my career/career choices in where I decide to teach in the future.") where men score lower.

Item	Gender	*N*	Mean rank	Mann–Whitney *U*	Wilcoxon *W*	*Z*	*p**
Q1	Woman	50	30.56	253.000	1,528.000	−1.685	0.092
	Man	14	39.43				
Q02	Woman	50	29.40	195.000	1,470.000	−2.768	*0.006*
	Man	14	43.57				
Q03	Woman	50	31.83	316.500	1,591.500	−0.568	0.570
	Man	14	34.89				
Q04	Woman	50	30.79	264.500	1,539.500	−1.460	0.144
	Man	14	38.61				
Q05	Woman	50	32.21	335.500	1,610.500	−0.245	0.807
	Man	14	33.54				
Q06	Woman	50	32.91	329.500	434.500	−0.346	0.729
	Man	14	31.04				
Q07	Woman	50	32.04	327.000	1,602.000	−0.398	0.690
	Man	14	34.14				
Q08	Woman	50	31.38	294.000	1,569.000	−1.031	0.303
	Man	14	36.50				
Q09	Woman	50	32.29	339.500	1,614.500	−0.198	0.843
	Man	14	33.25				
Q10	Woman	50	29.36	193.000	1,468.000	−2.844	*0.004*
	Man	14	43.71				
Q11	Woman	50	31.14	282.000	1,557.000	−1.157	0.247
	Man	14	37.36				
Q12	Woman	50	30.61	255.500	1,530.500	−1.659	0.097
	Man	14	39.25				
Q13	Woman	50	30.91	270.500	1,545.500	−1.402	0.161
	Man	14	38.18				

Table 3.
Mann–Whitney *U* test for independent samples (gender)

Note: *$p < 0.05$ is recognized as statistically significant (in italic)
Source: Authors

Differences regarding having traveled abroad

As we did to compare the similarities and differences regarding gender, Mann–Whitney *U* and Wilcoxon *W* tests were also applied to the 13 items to determine whether there are statistically significant differences among participants' responses considering whether they had traveled abroad or not before the virtual mobility facilitated by the COIL project.

As observed in Table 4, statistically significant differences were not found when comparing whether the participants had previously traveled abroad or not. Nevertheless, participants who had traveled abroad before participating in this COIL project tend to score lower (i.e. have a higher intercultural awareness and integrate better educational technology in the COIL experience) than those who had not had this type of experience. Only in four items did participants who had never traveled internationally have the lowest scores, including Q02 ("The COIL component of this course made me more globally aware"), Q08 ("I felt prepared for the technology demands of the COIL component of this course"), Q09 ("The technology chosen felt appropriate for the needs of the experience") and Q13 ("Overall, at the end of the COIL component of this course I felt. . .").

Discussion and conclusion

As it has been previously mentioned, COIL has the potential to revolutionize education in general and language education in particular by offering students opportunities for intercultural communication and authentic language practice. With this idea in mind, this

Item	Traveling abroad	*N*	Mean rank	Mann–Whitney *U*	Wilcoxon *W*	*Z*	*p**
Q01	Yes	60	32.35	111.000	1,941.000	−0.267	0.789
	No	4	34.75				
Q02	Yes	60	32.58	115.000	125.000	−0.152	0.879
	No	4	31.25				
Q03	Yes	60	31.58	65.000	1,895.000	−1.592	0.111
	No	4	46.25				
Q04	Yes	60	31.87	82.000	1,912.000	−1.109	0.268
	No	4	42.00				
Q05	Yes	60	31.92	85.000	1,915.000	−1.008	0.313
	No	4	41.25				
Q06	Yes	60	32.42	115.000	1,945.000	−0.144	0.885
	No	4	33.75				
Q07	Yes	60	32.43	116.000	1,946.000	−0.118	0.906
	No	4	33.50				
Q08	Yes	60	32.93	94.000	104.000	−0.817	0.414
	No	4	26.00				
Q09	Yes	60	33.30	72.000	82.000	−1.545	0.122
	No	4	20.50				
Q10	Yes	60	32.36	111.500	1,941.500	−0.263	0.793
	No	4	34.63				
Q11	Yes	60	32.43	115.500	1,945.500	−0.131	0.896
	No	4	33.63				
Q12	Yes	60	32.28	107.000	1,937.000	−0.390	0.697
	No	4	35.75				
Q13	Yes	60	32.58	115.500	125.500	−0.136	0.892
	No	4	31.38				

Note: *$p < 0.05$ is recognized as statistically significant (in italic)
Source: Authors

Table 4. Mann–Whitney *U* test for independent samples (traveling abroad)

paper has attempted to explore the perceptions of pre-service language teachers regarding the influence of a COIL project on their intercultural competence and awareness. The analyses developed have allowed achieving this goal, as it has shown how participants considered that COIL provided them with an opportunity to increase their intercultural competence and global awareness, thanks to the contact with future teachers from a different culture that was facilitated by the online collaborative project. These findings certainly mirror those of previous studies (e.g. Katre, 2020; Muñoz-Escalona *et al.*, 2022; Ramírez-Marín *et al.*, 2020) that proved the benefits of COIL in terms of promotion of intercultural competence and international perspectives.

At this stage, it is necessary to revisit the hypotheses of the study (see Table 1). *H1* (*Pre-service language teachers have a positive attitude regarding how COIL experiences can improve their intercultural awareness when integrated into CALL processes*) is corroborated, as participants felt that COIL might have influenced their cognitive frameworks concerning their global perspective, enhanced their global awareness, equipped them with valuable skills and knowledge for the future and boosted their interest for future international cultural exchange opportunities (see Table 2, where the higher the percentage in values 1 and 2, the more positive the opinions). These findings are in line with similar studies that demonstrate that online collaboration can increase learners' intercultural skills (Ramírez-Marín *et al.*, 2020) and their readiness for future cultural exchange (Kayumova and Sadykova, 2016). Nevertheless, it is worth mentioning that participants considered that the

COIL experience may not have had an effect on their future career in relation to where they would decide to teach. Likewise, respondents thought that COIL did not help them make relationships that could be maintained over time, which could be a result of the asynchronous nature of communication in this project, as research shows that synchronous and combined learning methods result in higher motivation among students (Moallem, 2015).

H2 (*There are significant differences concerning the perceptions of pre-service language teachers regarding COIL in terms of gender*) is partially corroborated, as statistically significant differences were only found concerning the potential of COIL for global awareness and participants' likelihood to recommend COIL to other teachers. Nevertheless, women showed better attitudes toward COIL in most of the items considered (see Table 3, where the mean ranks of women are lower than those of men). These results voice the findings of Morsi and Assem (2021), who revealed that women COIL learners had more preference for cooperative online learning environments than their men counterparts. Their findings pinpointed that women were more willing to take part in this type of learning, were more self-directed and had better communication skills and online presence. Nevertheless, the findings of this study contrast with those of Huertas-Abril and Palacios-Hidalgo (2023), who found better attitudes among men when examining the effects of COIL on pre-service language teachers' digital skills. In any case, and as Morsi and Assem (2021) suggest, "[COIL] instructors should encourage their students to work collaboratively in gender-diverse balanced groups which maximize the benefits of different gender's traits, scientific thinking abilities, and communication skills in achieving higher quality group work" (p. 914).

Regarding the impact of gender on participants' perceptions toward COIL, there was an uneven distribution of male and female subjects in our study, with 78.1% being female and 21.9% being male. Nevertheless, this disproportion can be justified by taking into account the feminization of the teaching profession, as numerous studies indicate that it is more prevalent for teachers to be female not only in the Spanish context (González-Alba *et al.*, 2021; Verástegui-Martínez, 2018) but also in others (Kelleher, 2011; Schmude and Jackisch, 2019). In any case, the results show valuable insights into the attitudes of participants toward the potential of COIL.

Finally, *H3* (*There are significant differences concerning the perceptions of pre-service language teachers regarding COIL depending on whether they have previously traveled abroad or not*) is rejected. Nevertheless, a correlation was found between not having traveled and a better attitude toward the integration of technology for intercultural exchanges (see items Q02, Q08, Q09 and Q13 in Table 4, where mean ranks are lower for those participants who have not traveled to another country). This seems to suggest that those participants who have not traveled abroad considered COIL to be a good opportunity to compensate for the lack of knowledge or experience with other cultures resulting from not having had the opportunity to visit other countries. This idea is indeed shown in research, as "COIL empowers participating students who cannot travel or study abroad to partially experience authentic cultures of 'others' abroad" (Jiang, 2022, p. 33).

The results and conclusions in this research should be however interpreted in the light of three limitations. First, the study has been exploratory as it has only considered the perspective of one of the parts involved in the COIL project. Therefore, the results might not be generalizable to other settings, and further research should consider the comparison between all the parties involved in the virtual exchange. Second, the sample size has been limited and so has been the number of men and women considered in the study, which may have affected the findings in terms of gender-based differences. Third, data have been only

analyzed quantitatively, and qualitative information could provide researchers with a complementary perspective and extend the results. Fourth, results are only based on self-reported data, so they may be biased because of participants' subjective opinions and beliefs. Further studies should consider recruiting a larger, more gender-balanced sample and using additional sources of data, such as digital products created during the COIL project and semi-structured interviews or focus groups, to deepen the results.

Nevertheless, and considering the opportunities of COIL revealed from this study, the following practical pedagogical recommendations could be borne in mind:

- COIL needs to be seen as a powerful tool to promote global learning, intercultural understanding and the development of skills among students that will be vital for success in today's interconnected world.
- Teacher training is essential to get the most out of COIL. In this line, nor only should teachers experience online collaboration in their training but also provided with knowledge and strategies to bring virtual collaboration to their classrooms.
- Universities and teacher training centers need to rethink the way they are preparing future teachers for the increasing demands to prepare students for the requirements of the global world, and to do so, they need to consider that COIL may offer them significant benefits.
- COIL needs to be regarded as a cost-efficient substitute for conventional study abroad initiatives, enabling students to access international exposure and experiences without the requirement for physical travel, thereby enhancing accessibility and affordability for a broader range of learners.

Ethical statement

The authors declare no conflict of interest. The authors declare that the content of this paper presents an accurate account of the work performed as well as an objective discussion of its significance. This work is entirely original, and others' work has been cited appropriately. Institutional requirements were followed in data collection procedures, and data analysis were carried out after grades had been assigned.

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