

# Sustainable development goals and transversal competences through L2/3 virtual exchange

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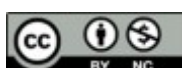
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## ABSTRACT

This pilot study explores the effects of virtual exchange in the higher education setting. The core goal is to investigate the potential new training environments in second or third-language learning and relate their use to competence enhancement and sustainability awareness. Through quantitative, qualitative, and pre-/post-test methods, the researchers detected a positive trend in the online didactic application, which led to the increased capacities of international learners. Moreover, this project has provided an exciting opportunity to compare the advancements of technology and humanities undergraduates from Spain and Croatia. Given the importance of intercultural cooperation among different nationalities, this interaction process offers a new communication channel linked to sustainability and competence development in English as a Foreign Language. Besides, the debate about online collaboration's role in foreign language course design has gained fresh insights and delivered experimental data worth further consideration.

**Keywords:** *sustainability; transversal competences; virtual exchange; university students; second language acquisition.*



## I. INTRODUCTION

Sustainability, or the capacity to maintain economic and environmental equilibrium (Kasmire, 2021), is a critical problem for today's society. The appearance of sustainability in the civil, economic, social and environmental arenas reflects the necessity to enhance global community pathways (Mensah, 2019). In the same vein, application of this topic to education paradigm is a common challenge at university on management, learning, capacity development and research levels (Hallinger & Chatpinyakoo, 2019). To what extent can online collaboration experience add value to higher education stakeholders in second/third (L2/3) language?

Keeping track of positive outcomes presented by numerous scholars, telecollaboration and virtual exchanges tend to produce international collaborations mainly focused on intercultural, language and digital competences aiming at global citizenship (Barbosa & Ferreira-Lopes, 2023; Gutiérrez & O'Dowd, 2021; Machwate et al., 2021). The innovative strategy we describe in this study is the one that brings closer the notion of sustainability goals and transversal competence to international technical and non-technical participants of this virtual exchange.

Although it is widely argued that online exchanges support the internationalisation of higher education (O'Dowd, 2022), it frequently conflicts with the necessity of giving educators assistance and extra time to implement these initiatives (Helm, 2015). As O'Dowd (2023, p.11) states, "VE refers to the different online learning initiatives and methodologies which engage learners in sustained online collaborative learning and interaction with partners from different cultural backgrounds as part of their study programmes and under the guidance of teachers or trained facilitators".

The technique chosen for this study is suitable due to its adaptability to different contexts and circumstances and open-plan design covering several meaningful areas such as sustainable development goals, active learning methodologies, language learning, and competences progressing through online interaction.

In our study, we demonstrate that virtual exchange applications offer a reliable solution to the emerging role of online interuniversity partnerships. The research questions (RQ) that could be asked include:

RQ1 How could we relate Sustainable Development Goals to virtual exchange?

RQ2 What are the possibilities for relating transversal competences to virtual exchange activities?

RQ3 What is the most significant effect of virtual exchange experience in technical and non-technical/ humanities students?

The rest of the paper proceeds as follows. We justify sustainability- and competence-oriented language learning via interactive cooperation among university students. Next, using experimental methodology, we position our research on the crossroads of quantitative and qualitative terms. Furthermore, we place our results on earlier research in the field. In the end, we draw a conclusion.

## **II. LITERATURE REVIEW**

An evolution of the second/third (L2/3) language learning methods in recent years reflects how modern society addresses the crucial importance of English as a *lingua franca*. In the world of technology and science, business and education, communication and tourism, English is the most frequently spoken language (Rao, 2019). As university students must advance in a way that is competence-oriented, our study focuses on the following learning components: (a) sustainable development goals, (b) transversal competences and (c) virtual exchange, all of them connected to professional English as a Foreign Language, or EFL, setting.

### **II.1. Sustainable Development Goals**

A major source of inspiration and vision for Sustainable Development Goals - SDGs - is the General Assembly Resolution A/RES/70/1 called "Transforming Our World, the 2030 Agenda for Sustainable Development" (United Nations, 2015 October). It is a

driving force and “a plan of action for people, planet and prosperity” (*ibid*, 1). Thanks to this global focus, one can relate economy, society and environment through 17 specific tasks by involving relevant stakeholders in higher education institutions (Purvis et al., 2019; Zamora-Polo & Sánchez-Martín, 2019).

The Sustainable Development Goals (SDGs) present a deeper projection of new tactic of caring for human rights, gender equality and female empowerment. They are a feasible roadmap to fight against poverty and the deterioration of the planet and to encourage prosperous and peaceful human existence in harmony with the environment. It is, therefore, essential to transmit the Agenda priorities to university-level learners in a dynamic and evocative manner. To do so, only two goals were selected for the current study (United Nations, 2015, October, pp. 17, 26):

SDG 4 “Quality education: ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”;

SDG 17 “Partnerships for the Goals: strengthen the means of implementation and revitalise the global partnership for sustainable development”.

Originally, several benefits of adopting the SDGs into academic curriculum have been highlighted by Leal Filho et al. (2021): relevance and credibility of university preparation, promotion of common concepts of sustainability, enhancement of institutional learning standards or improvement of links between students, faculty, and surrounding community, among others. In our case, the specific choice of SDG 4 is prompted by the necessity to prepare young people for the labour market, whereas SDG 17 is aligned with the need to implement efficient and focused capacity building.

## **II.2. Transversal competences**

These days, uplifting young people’s knowledge, skills and attitudes has taken centre stage of the EU training focus. In accordance with this, Higher Education Institutions (HEIs) give priority to capacity building as a vital part of the quality preparation of future specialists. By tackling not only life-long learning cultural, digital, and multilingual competences but also promoting transversal competences of decision-making,

leadership or teamwork, we prepare modern students in a variety of areas (European Commission, 2021 June; Sá & Serpa, 2018). Following Polyakova & Galstyan-Sargsyan (2020), transversal competence is defined as the ability to use acquired knowledge to resolve various problems in a related context of study.

In the above context, it might be useful to define the core idea of this process, the competence. It is the capacity to successfully complete a certain task that requires a blend of contextually appropriate knowledge, skills and attitudes (European Commission, 2019 March; Polyakova & Galstyan-Sargsyan, 2019, 2020). Particularly, EU Commission experts (2021, p. 4) state that transversal skills and competences “are learned and proven abilities” considered beneficial for any life activity. Due to this, it is crucial to promote capacity development at the tertiary level.

When designing an online didactic experience, we are creating a meaningful learning scenario for undertaking transversal competences’ dimensions suggested by *Universitat Politècnica de València* (UPV). The following Transversal Competences (TCs) are established by UPV (Universitat Politècnica de València, 2022, July) and will back our investigation:

TC1: Social and environmental commitment (Act with ethics and professional responsibility in the face of social, environmental and economic challenges).

TC2: Innovation and creativity (Propose creative and innovative solutions to complex situations or problems, specific to the field of knowledge).

TC3: Teamwork and leadership (Collaborate effectively in work teams, assuming responsibilities and leadership roles and contributing to collective improvement and development).

TC4: Effective communication (Communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience).

TC5: Responsibility and decision-making (Act autonomously in learning, making informed decisions in different contexts).

### II.3. Virtual exchange

The transferability and cross-disciplinary nature of knowledge become even more important in the academic world, which is experiencing rapid technological, social, and pedagogical changes. Adopting a combined approach also means taking advantage of the many opportunities that the online environment presents, particularly virtual exchanges (VE). These continuous, technologically enhanced, interpersonal educational initiatives bring language learners from various cultural backgrounds for interacting and improving L2/3, digital or intercultural capacities (EVOLVE, 2024; O'Dowd & O'Rourke, 2019).

Embracing this collaboration approach in healthcare, digital humanities or engineering education (Bowen et al., 2021; Dorroll et al., 2019; Kattwinkel et al., 2021) fosters cooperation among interconnected institutions, promotes sustainability and motivates undergraduates. Additionally, Giralt et al. (2022) propose a variety of scenarios: blended mobility format where VE is combined with real-life mobility, stand-alone learning activity in VE format or VE as a traditional or online course component. In the latter option, a balanced integration of online interaction could be the optimum choice for the current study.

Continuing with some practical implications of synchronous online exchanges, it is therefore crucial for partakers to split the process into three parts (Gutiérrez et al., 2021). Before the interaction, appropriate use of technology, netiquette, and organisational and general issues need to be attended to; during the exchange, attention is paid to communication strategies and personal correspondence; finally, after the virtual collaboration, critical reflection brings the process to an end. These mentoring recommendations are consistent with our VE, too.

A significant challenge in this field is to develop and quantify competence achievement in a virtual exchange environment. Researchers have mainly focused on digital, communication, intercultural abilities and internationalisation from a qualitative or empirical perspective in primarily asynchronous settings (Avgousti, 2018; Machwate et al., 2021; O'Dowd, 2017). This current research follows two new directions. Firstly, we

propose an approach that measures learners' perceptions before and after synchronous cooperation. Secondly, our students work on suggested topics to connect them with competence-building and understanding of sustainable goals.

### **III. METHODOLOGY**

Following online collaboration pathways designed by renown scholars (Dooly & Vinagre, 2021; Helm, 2017; O'Dowd, 2018; Rubin & Guth, 2023), we now examine in more detail the methodological procedure. Although these guidelines contain useful pedagogic or scholarly information, it might be challenging to reconcile both interests. To face this challenge, we devised a parallel two-fold scheme comprising didactics and investigation. This division also facilitates the preparation of tasks among the project organisers to distribute certain mentoring or research components.

#### **III.1. Study outline**

The pilot study was part of the project for didactic innovation named "Plurilingualism, Sustainability, Universities", carried out by the *Universitat Politècnica de València* (UPV), Spain. This initiative was designed to promote sustainability values among undergraduates and generate an impact on the international cooperation level. By innovating in language pedagogies, we explore new communication scenarios and foster capacity development via online interaction. Additionally, Spanish learners and faculty are able to broaden cultural networks by partnering with other European universities.

The present study was designed with the objective of connecting students from two coastal cities through the project of virtual exchange. It was carried out at the *Universitat Politècnica de València* (UPV), Spain, and the University of Zadar (UniZd), Croatia, in the first semester of 2022/2023. It was aimed at the advancement of students' transversal competences as well as their awareness about Sustainable Development Goals, particularly SDG 4 "Quality education" and SDG 17 "Global partnership".

Figure 1 below provides an overview of the steps required to ensure project completion. The main topics of the initiative were to compare the education systems of different countries and identify the main features of the compared systems. Various cooperative tasks such as group discussion, project work, visuals design and oral presentation were concluded using Microsoft Teams and other online tools. Three synchronous sessions and mixed group meetings were planned, each of them lasting for approximately 90 minutes. Students were also encouraged to plan as many asynchronous interactions as needed so that they could complete the assignments.



Figure 1. Virtual Exchange summary.

### III.2. Participants

The study was conducted on a sample of 20 participants, i.e., 11 third- and fourth-year undergraduate students (55% of the total sample) at UPV, Spain, and nine first-year undergraduate students (45% of the full sample) at UniZd, Croatia. Spanish students were mostly male (78%, nine persons), majoring in technical studies, i.e. Industrial Engineering. On the other hand, most Croatian students were female (87%, eight persons), and they were double majoring in humanities, i.e. English Studies.

According to CEFR (Council of Europe, 2020), Spanish learners were at B1/B1+/B2 English level in contrast to Croatian learners who were at C1 English level. Participation in the project was mandatory for UPV students but voluntary for UniZd students. Thus, Spanish students were graded for their participation in the activities as well as for the



accomplished assignments, whereas Croatian students participated in the project to support international collaboration between the institutions.

### **III.3. Procedure**

The project was carried out between 17 November - 22 December 2022. In the first session, students were divided into four mixed UPV and UniZd teams. Collaborating in separate breakout rooms, Team 1 and Team 2 were asked to read online articles about the past and present of education in Spain and Croatia, the former regarding basic education and vocational training and the latter regarding higher education with an emphasis on technology and humanities. Team 3 and Team 4 were required to search for information about the education systems in Spain and Croatia and compare them to the UK and US systems, respectively.

In the second session, students continued their collaboration to create visual support for the data collected, such as posters or infographics, using the online tool *Canva*. They were also encouraged to organise asynchronous sessions to prepare a presentation about their findings, which was planned for the last session.

In the last session, each team presented their group findings using visual support. Prior to their participation in the activities as well as at the end of the virtual exchange, the participants were required to self-evaluate their understanding and application of transversal competences and SDG 4 and 17 as well as give their comments on the initiative.

Our implementation process is based on the training approach called the Sustainable Active Virtual Learning (SAVL) model designed by Polyakova & Galstyan-Sargsyan (2022). Its primary focus on four key outputs – Sustainable Development Goals and Agenda 2030 [S], Active Learning Methodologies & cooperation [A], Virtual exchange and digital tools [V], Language learning and competences [L] – determine the collaboration process and facilitate and assist in establishing priorities and targets.

Additionally, the following descriptive details of the VE structure give a comprehensive picture of the exchange process:

**Table 1.** Virtual Exchange structure. Based on Polyakova & Galstyan-Sargsyan (2022).

<b>Course details: 2022/23</b> <b>Dates: 17<sup>th</sup> November,</b> <b>1<sup>st</sup> &amp; 22<sup>nd</sup> of December</b> <b>2022</b> <b>15:30-17:00</b>	<b>University 1 / Faculty</b> <b>Universitat Politècnica de València</b> <b>(UPV), technical studies</b>	<b>University 2 / Faculty</b> <b>University of Zadar</b> <b>(UniZadar), humanities</b>
<b>Coordinators:</b> <b>Polyakova, O. &amp; Lovrović,</b> <b>L.</b>	Number of students: 11, mainly male	Number of students: 9, mainly female
<b>Organisers:</b> <b>UPV &amp; UniZadar</b>		
<b>Research support:</b>		
<b>1. Project name</b>	Education Systems in different countries	
<b>2. Aim</b>	To design a poster / infographics (Canva.com)	
<b>3. Objectives</b>	9) Identify the main features of the compared systems 10) Compare the education systems of different countries 11) Create visual support for the data collected 12) Present the group findings.	
<b>4. Sociocultural topics</b> <b>Competences</b>	SDG 4 & 17  UPV TCs	
<b>5. Languages</b>	L2/3 (English)	L2/3 (English)
<b>6. Task</b>	Activity design, process and structure (short description) Topics: <ul style="list-style-type: none"> <li>• Past and present of education in Spain &amp; Croatia: basic education / vocational training</li> <li>• Past and present of education in Spain &amp; Croatia: higher education (tech &amp; humanities)</li> <li>• Education in Spain &amp; Croatia compared to the UK system</li> <li>• Education in Spain &amp; Croatia compared to the US system</li> </ul>	

7. Evaluation	Description and rubric
<b>8. Number of session</b>	3
<b>9. Session planning</b>	<p>Session 1 (November, 17):</p> <p>Project presentation Questionnaire (pre-test) Teaming up Ice-breaker Reading point (1 per group) Discussion question</p> <p>Session 2 (December, 1):</p> <p>Refer to the main points of the Session 1 Linking words &amp; phrases CANVA &amp; G-Drive shared docs Poster / infographics submissions</p> <p>Session 3 (December, 22):</p> <p>Group presentations (7-10 mins / per group) Discussion &amp; feedback Questionnaire (post-test)</p>
<b>10. Final session</b>	Final task presentation and virtual exchange discussion =Session 3
<b>11. Grading and feedback</b>	Assessment of the learning outcomes UPV= 0,5/10 UniZadar= speaking part of the oral exam Lecturers' field notes
<b>12. Research</b>	SDG 4 & 17 + UPV TCs focus Quantitative & qualitative research methods

### III.4. Research methodology

This study process relies on educational research which guiding principle is “fitness for purpose” (Cohen et al., 2018, p.173). For connecting our research questions with the research enquiry framework (Peel, 2020; Butler, 2011), we follow the stages of (1) identifying the issue, (2) collecting the data, (3) preparing and engaging with the data,

(4) analysing thematically, (5) interpreting the data analysis and (6) composing the research paper.

Regarding specific methods, here we apply quantitative and qualitative approaches. In his thorough examination of educational research methodology, Creswell (2012) defines statistical analysis of collected numerical data as quantitative approach and text data analysis as qualitative approach. Following the guidelines of Cohen et al. (2018) and due to the reduced sample size, it was possible to design a mixed questionnaire with 7 closed questions and an open-end item.

To this end, two identical pre-/post- questionnaires with Google Forms were created for the project and validated. In both cases, we asked 20 participants to share their perceptions of individual Transversal Competences and Sustainable Development Goals achievement (closed questions, 5-point Likert scale range, numerical data) and briefly comment on the VE initiative (open response, textual information).

Therefore, the data collection process was based on two questionnaires segmented by data type: numbers and texts. Two different tools have been chosen to measure each data type. On the one hand, the Statsgraphics Centurion tool provided most of the statistical assistance for the closed questions or quantitative items reliability. On the other, Wordcloud embedded in MAXQDA tool helped analyse open questions or qualitative data.

## **IV. RESULTS**

This section offers a two-tier -didactic and research- setting of results and discusses the experiment implications. In other words, we first present learning outcomes then followed by quantitative and qualitative analyses.

### **IV.1. Training outcomes**

After 8 weeks of project planning and running, we finally have specific implementation results aligned with sustainability and competence development. Figure 2 shows

visuals created by the four teams, each of them representing one aspect of education in different countries. As can be seen in the above illustrations, students focused on the main features of the compared education systems and presented them clearly using digital tools.

Furthermore, the benefits of this collaboration are multiple. Since students speak different native languages, they were required to speak English in order to fulfil the tasks, thus working on their L2/3 communication skills. What is more, collaborating in international teams and comparing different education systems was beneficial for the development of their intercultural competence in international contexts as recommended by Cavalheiro (2015). Also, they were able to develop their digital skills useful for future employability (Deacon et al., 2017) as they were supposed to use an online tool to create visuals. Last but not least, they were learning how to work in teams in an intercultural environment and overcoming the challenges of virtual teamwork listed by Dubé & Robey (2009).

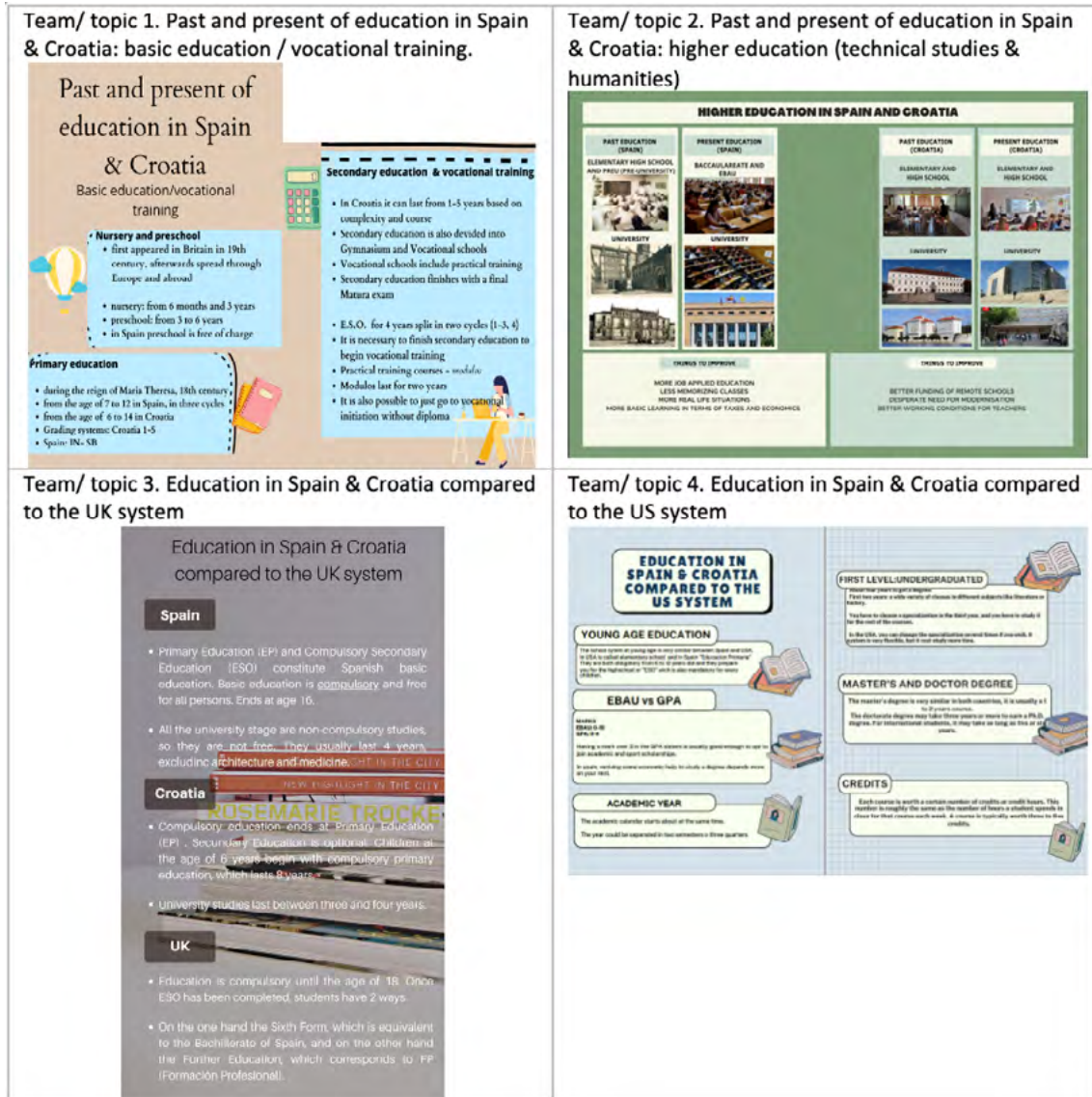


Figure 2. Virtual Exchange learning outcomes.

## IV.2. Research outcomes: quantitative analysis

### a) Cronbach's alpha

Before commencing a detailed scrutiny of the pre- and post-test results, the data consistency overview should be delivered. For this, Cronbach's alpha, the essential statistic indicator of reliability equalling .7 or above is often regarded as a credible threshold for a range of variables (Field et al., 2012). It can be seen from the graphs below that we obtained Cronbach's alpha for the pre-test is .72 and for the post-test .88, which shows satisfactory reliance. Attention must be paid to the pre-TC2 variable

which if omitted, would result in the greatest rise in alpha. Likewise, SDG17-post might carry a small note of caution because of the same issue.

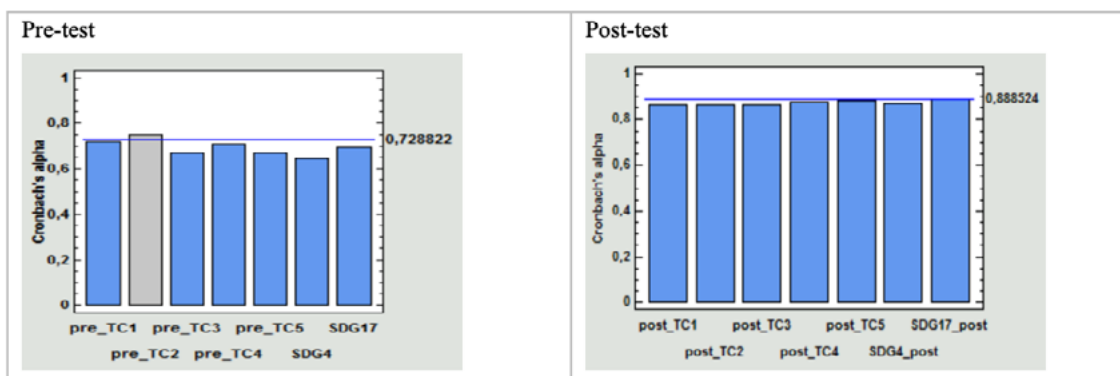


Figure 3. Pre- and post-test questionnaires' reliability.

### IV.3. Research outcomes: qualitative analysis

#### a) a) Pre-test & post-test questionnaires results

To assess exchange participants' advancement, we followed a one-group pre-test and post-test pre-experimental design technique (Cohen et al., 2018). This approach to a curriculum innovation measures the differences between same-group attitudes before and after the didactics implementation. Hence, Table 2 below compares the answers of 20 participants from UPV and UniZd at the beginning and at the end of the implementation process.

Table 2. Pre-test & post-test results, 20 students.

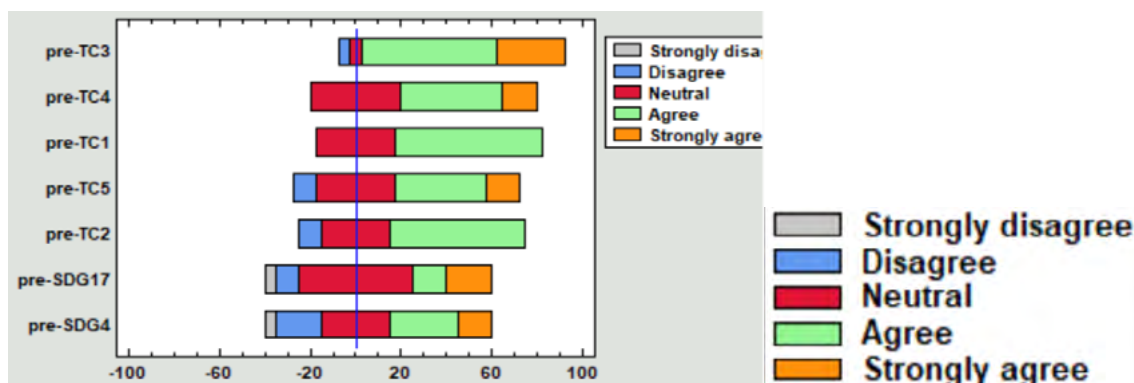
	Pre-test		Post-test	
	Respondents	%	Respondents	%
Question 1. Transversal competences achievement. Please, self-evaluate your understanding and application of each competence, being 1 the lowest and 5 the highest levels. [TC1: Social and environmental commitment - Act with ethics and professional responsibility in the face of social, environmental and economic challenges]:				
Strongly disagree (1)	0	0	0	0
Disagree	0	0	1	5%
Neutral	7	35%	2	10%

Agree	13	65%	10	50%
Strongly agree (5)	0	0	7	35%
Question 2. Transversal competences achievement. Please, self-evaluate your understanding and application of each competence, being 1 the lowest and 5 the highest levels. [TC2: Innovation and creativity - Propose creative and innovative solutions to complex situations or problems, specific to the field of knowledge]:				
Strongly disagree (1)	0	0	0	0
Disagree	2	10%	1	5%
Neutral	6	30%	1	5%
Agree	12	60%	10	50%
Strongly agree (5)	0	0	8	40%
Question 3. Transversal competences achievement. Please, self-evaluate your understanding and application of each competence, being 1 the lowest and 5 the highest levels. [TC3: Teamwork and leadership - Collaborate effectively in work teams, assuming responsibilities and leadership roles and contributing to collective improvement and development]:				
Strongly disagree (1)	0	0	0	0
Disagree	1	5%	1	5%
Neutral	1	5%	5	25%
Agree	12	60%	8	40%
Strongly agree (5)	6	30%	6	30%
Question 4. Transversal competences achievement. Please, self-evaluate your understanding and application of each competence, being 1 the lowest and 5 the highest levels. [TC4: Effective communication - Communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience]:				
Strongly disagree (1)	0	0	0	0
Disagree	0	0	1	5%
Neutral	8	40%	4	20%
Agree	9	45%	7	35%
Strongly agree (5)	3	15%	8	40%



Question 5. Transversal competences achievement. Please, self-evaluate your understanding and application of each competence, being 1 the lowest and 5 the highest levels. [TC5: Responsibility and decision-making - Act autonomously in learning, making informed decisions in different contexts]:				
Strongly disagree (1)	0	0	0	0
Disagree	2	10%	2	10%
Neutral	7	35%	3	15%
Agree	8	40%	11	55%
Strongly agree (5)	3	15%	4	20%
Question 6. Sustainable development goals (SDGs) achievement. Please, self-evaluate your understanding and application of each goal, being 1 the lowest and 5 the highest levels. [SDG 4 - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all]:				
Strongly disagree (1)	0	0	0	0
Disagree	4	20%	1	5%
Neutral	6	30%	2	10%
Agree	6	30%	12	60%
Strongly agree (5)	3	15%	5	25%
Question 7. Sustainable development goals (SDGs) achievement. Please, self-evaluate your understanding and application of each goal, being 1 the lowest and 5 the highest levels. [SDG 17 - Strengthen the means of implementation and revitalize the global partnership for sustainable development]:				
Strongly disagree (1)	0	0	0	0
Disagree	2	10%	1	5%
Neutral	10	50%	5	25%
Agree	3	15%	9	45%
Strongly agree (5)	4	20%	5	25%

(a) Likert Plot, pre-test:



(b) Likert Plot, post-test:

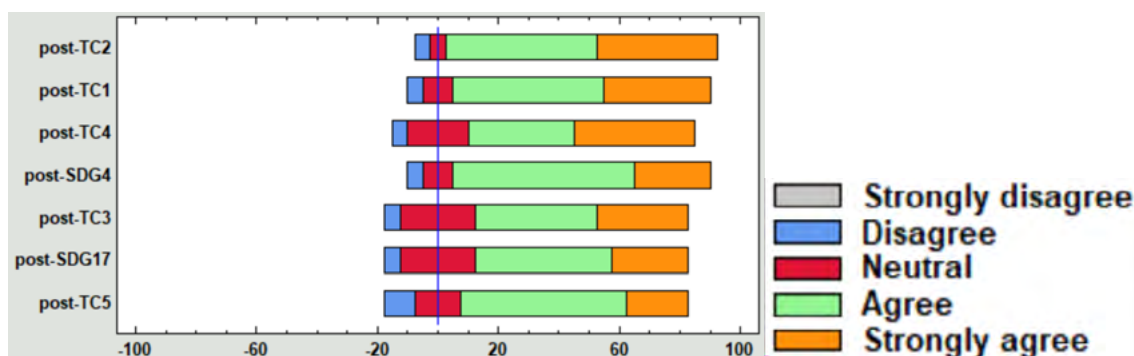


Figure 4. Likert plot of pre- and post-test data.

Table 2 and Figure 4 show the results of the pre-test and post-test, in which participants self-evaluated their understanding and application of 5 transversal competences and SDGs 4 and 17 using the Likert scale, being 1 (*strongly disagree*) the lowest and 5 (*strongly agree*) the highest level.

In the pre-test, a large number of participants (65%) showed high understanding and application of TC1 (Social and environmental commitment), whereas 35% of participants were neutral. In the post-test, a shift towards a more positive attitude can be noticed, i.e., 35% of participants strongly agreed and 50% agreed. However, 5% of participants showed the lowest level of understanding in the post-test, which was not the case in the pre-test.

As regards TC2 (Innovation and creativity), the results of the pre-test were similar with 60% of participants showing the highest level of understanding, whereas 30% were in

the middle of the scale and 10% did not show any understanding and application of the competence. In contrast, higher percentages (40% strongly agree and 50% agree) are noticeable in the post-test, whereas there is a decline in the number of participants who were neutral (5%) or disagreed (5%).

When it comes to TC3 (Teamwork and leadership), in the pre-test the majority of participants strongly agreed (30%) and agreed (60%), whereas 5% were neutral and 5% disagreed. However, in the post-test there was a tendency towards higher values with 30% of participants strongly agreeing and 40% agreeing. Also, there was a considerable number of those who were neutral and a small percentage of those disagreeing.

Even though participants showed a high level of understanding (15% strongly agreed and 45% agreed) regarding TC4 (Effective communication) in the pre-test, the values in the post-test were significantly higher (40% strongly agreed and 35% agreed). Also, there was an evident decline in the number of participants who were neutral (20% in the post-test as opposed to 40% in the pre-test). Nevertheless, in the post-test 5% of participants showed lower levels of understanding and application of the competence.

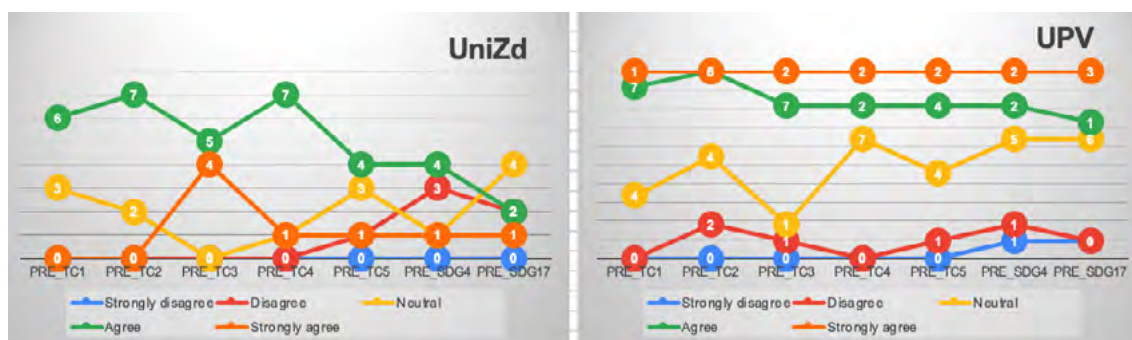
Similarly, participants showed high understanding (15% strongly agreed and 40% agreed) of TC5 (Responsibility and decision-making) in the pre-test, while 35% were neutral and 10% of them disagreed. However, in the post-test there was a tendency towards higher values with 20% of participants strongly agreeing and 55% of them agreeing with the statement. Accordingly, there was a decline in the number of those who were neutral (15%), but the number of participants who disagreed was the same (10%).

As for the understanding and application of SDG 4 “Quality education”, a tendency towards higher values is also visible in the post-test (25% strongly agreed and 60% agreed) in contrast to the pre-test in which 15% strongly agreed and 30% agreed. There was also a smaller percentage of neutral answers (10%) in the post-test compared to the pre-test (30%). Also, in the pre-test 20% of participants disagreed and 5% strongly disagreed, which is considerably higher than in the post test in which only 5% of participants disagreed.

As regards SDG 17 “Partnerships for the goals”, there are higher values in the post-test than in the pre-test as well. Precisely, 25% of participants strongly agreed and 45% agreed in the post-test, while 20% strongly agreed and 45% agreed in the pre-test. Also, there was a smaller number of those who were neutral in the post-test (25%) in comparison to the pre-test (50%). Accordingly, only 5% of participants disagreed in the pre-test, whereas in the pre-test 10% of participants disagreed and 5% strongly disagreed.

Additionally, the figures below provide the attitudes of learners measured before and after the online interaction within parameters of technical and humanities undergraduates.

Pre-test results:



Post-test results:

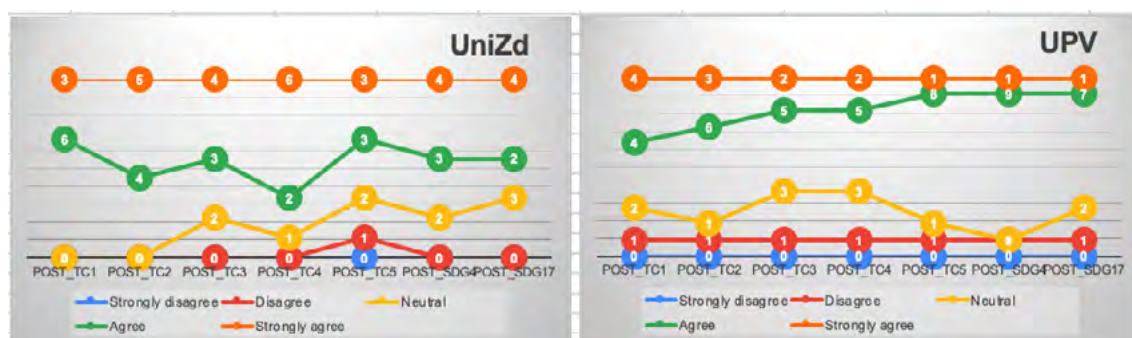


Figure 5. Graphical display of pre- and post-test data.

Figure 5 provides the overall results of the pre-test test and the post-test at both universities. It is evident that in the post-test participants showed higher values regarding their understanding and application of transversal competences and SDGs

4 and 17. However, regarding the results obtained at individual universities, it can be noticed that UPV students expressed higher values than UniZd students in the pre-test, whereas in the post-test a considerable shift towards higher values can be noticed among UniZd students as well, as shown in graphs.

b) Lecturers' field notes

The virtual exchange with the topic of *Education* was designed by the lecturers from the two universities. It took place during three synchronous sessions on Microsoft Teams and a number of asynchronous sessions organised by students. Students were divided into four teams, each discussing one of the following subtopics:

1. Past and present of education in Spain & Croatia: basic education / vocational training;
2. Past and present of education in Spain & Croatia: higher education (technical studies & humanities);
3. Education in Spain & Croatia compared to the UK system;
4. Education in Spain & Croatia compared to the US system.

The aim of the project was to design a poster/infographics using the online tool *Canva.com*, by means of which they were supposed to present their group findings. In order to do so, they needed to compare certain aspects of the education systems of different countries and identify the main features of the compared systems. Thereupon, students were required to create visual support for the data collected and to present the group findings in the final session. At the beginning and at the end of the virtual exchange, students were given a questionnaire in order to self-evaluate their understanding and application of transversal competences and SDGs 4 and 17 and to give their comments on this initiative.

c) Participants' pre-test comments

Beyond the instructors' focus, it is also revealing analyse the view stands of the students as active partakers. For addressing them, we applied a qualitative or content analysis of the last question of pre- and post-test requesting their textual comments

on the training activities. By utilizing available visual tools of MAXQDA 2020 software and adopting recommendations of Kuckartz & Rädiker (2019), we processed textual data and obtained the upcoming details:

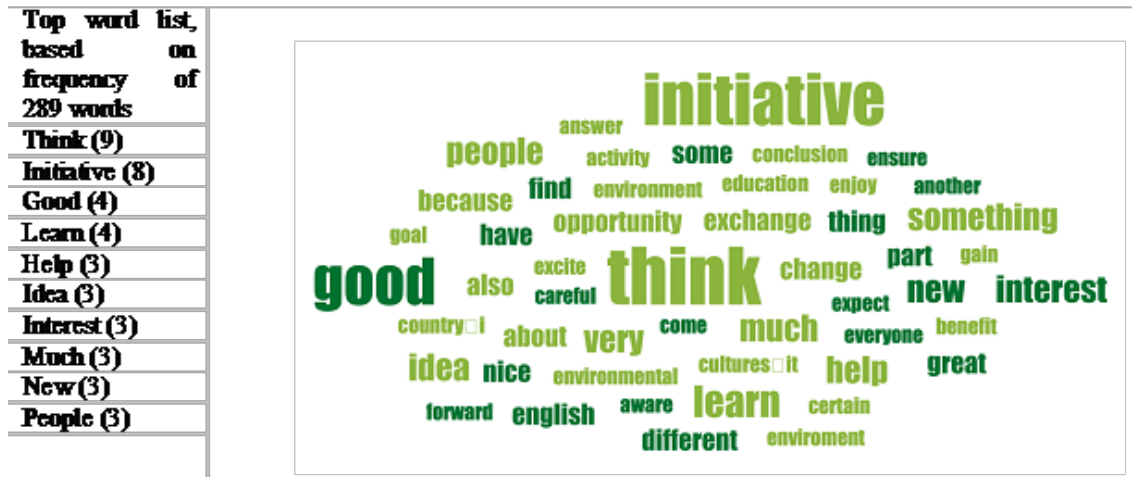


Figure 6. Word cloud information of pre-test data.

As shown in Figure 6, while giving comments about this initiative in the pre-test, participants used 289 words in total, among which the most frequently used were *think*, *initiative*, *good*, and *learn*. These show certain positive expectations of the learners.

Moreover, while reading their comments in the pre-test, they were very enthusiastic about the project as they found it beneficial for different reasons. Firstly, participants recognised the importance of the development of their intercultural competence, e.g. *“It is very interesting to meet people from another country.”* (S1); *“I find it a great opportunity for exchange of ideas and understanding thoughts of people from different cultures.”* (S2). Additionally, they expected to practice their language skills talking to native speakers of another non-English language, e.g. *“I expect enjoy the activity learning English with those students.”* (S3); *“It seems to me a good initiative to practice English and also have a good time.”* (S4).

What is more, participants were also aware of the new knowledge which could be acquired through the project, e.g. *“I find this initiative very interesting and I think that many people can benefit from it. I also think that we need to ensure the education for*

everyone and that together in this exchange we can come to certain conclusions that will help us reach our goals.” (S5); “It is a wonderful idea and I am looking forward to learning something new.” (S6); “New to this, so my knowledge on subject is mediocre, tho im willing to learn.” (S7); “I can’t wait to start and gain some new outlooks on life.” (S8); “I think that this initiative is a good way of learning something in a way that is different to what we are used to as students.” (S9).

d) Participants’ post-test comments

Due to accessibility of observations shared with us by virtual exchange students, we can look into their perceptions once the experiment was finished. Once again, the MAXQDA text processing highlights the word frequencies for building an informative visualization of data.



Figure 7. Word cloud information of post-test data.

While commenting on this initiative in the post-test (see Figure 7 above), participants used 417 words in total, which is considerably more in comparison to the pre-test. Regarding the frequency of the used words, the most repeatedly used were also the words such as *think*, *initiative*, *good*, and *learn*. However, it is evident that some additional words also came in the foreground, e.g. *like*, *English*, *experience*, *student*, *exchange* and *great*.

According to participants’ comments, their expectations were mostly fulfilled during the project of virtual exchange. They found it beneficial regarding the development

of both their intercultural competence and English language skills, e.g. *“For me, this was a great opportunity to collaborate with students from Spain and learn something new about education in Spain and Croatia, their differences and similarities.”* (S1); *“I think that this exchange has been very useful to practise English and learn things from other cultures.”* (S2); *“I really liked this virtual exchange, it showed me other ways of studying and I learned many new things about students from Valencia.”* (S3); *“But excluding that it is very useful to know new cultures and interact with other people that want to learn English.”* (S4); *“This initiative was great and useful for practising English language.”* (S5); *“This exchange has been very funny to me and my friends because we have learned English talking with Croatian people.”* (S6); *“I think that this is a great initiative to improve our English skills.”* (S7).

Furthermore, participants also appreciated the project for being innovative, e.g. *“It is an innovation and good initiative.”* (S8); *“I want to have more exchange activities like we had and really enjoyed.”* (S9); *“I think that this initiative is very well thought out and that it can help many students.”* (S10). However, a few students pointed to the shortcomings of the project, e.g. *“I think it was a very good initiative. However I think it would be better to have a little bit longer lessons so that it is possible to work closer together.”* (S11); *“It is a very interesting experience, but I think that some aspects can be improved, like the participation of the group”* (S12).

## V. DISCUSSION

In designing our didactic and research procedure, we drew upon existing need for active sustainability promotion and transversal competences implementation in virtual language learning environment. Continuing with this rationale, despite the fact that O’Dowd (2019), Helm (2017), Rubin & Guth (2023) previously described this setting, we develop and apply an independent approach.

O’Dowd (2019) motivated a transnational VE model of global citizenship and suggested it as the foundation for advanced cultural and language interactive collaborations



among two nations. Instead of improving the proposal, we choose other meaningful learning outcomes such as sustainability, or SDGs, and competences, or TCs. Finally, the framework of Polyakova & Galstyan-Sargsyan (2022) is a practical choice for the didactic innovation project structure. It also enables the parties to focus on cooperation not only between students, but also actively work within the community of educators.

### Sustainability

The concept of sustainability and its goals has been described before in the literature review. Notwithstanding some positive strides, it is quite challenging to apply this conceptual background to training curricula (Lenkaitis, 2022) or support the internationalisation of universities (Leal Filho et al., 2023). The task of organizing curricular activities centred on sustainability becomes increasingly intricate when integrating the 17 Sustainable Development Goals (SDGs). This is due to the diverse range of objectives encapsulated within the SDGs, which requires a thorough and interdisciplinary approach to curriculum design and implementation. There was thus a clear necessity to establish certain priorities in this regard by selecting a limited number of goals, SDGs 4 and 17, to explore and observe their achievement.

On SDG 4, this study found that online interaction changed the focus of our learners from mainly neutral and positive to a positive and strong perception of this value. This process has been quite dynamic in the case of both technical and linguistic students. In respect of SDG 17, progress of neutral viewpoint towards more positive “agree” or “strongly agree” opinions is a valuable exchange result.

### Transversal competences

A major source of motivation for adjusting transversal competences is recent work of European commission (2019, June) and Universitat Politècnica de València (2022, July). By implying five TC dimensions, UPV Institute of Education Sciences suggests a solid and quantifiable background for their attainment. Dimdiņš et al. (2022) present a thorough assessment of these transferable abilities but did not offer any small-scale evaluation version. Our approach is mainly structured upon detecting students' competence level self-assessment before and after pedagogical practice.

The research outcomes regarding the evolution of five transversal competences are in alignment, demonstrating a heightened level of positive attitude and a more robust consensus on their beneficial impact. As Figure 4 shows, it is surprising that virtual exchange moved the majority of neutral or undecided opinions to more optimistic “agree” or “strongly agree” fields. However, the observed this upward trend to be clearer in UPV data as compared to UniZd responses. Further research into this difference might be required to establish its causes.

In the process of designing and implementing our approach, we drew upon extant literature in the related fields. Diverging from prior techniques that were tailored to specific foreign language and intercultural experiences and similar training settings, our research setting encompasses mixed contexts, including engineering studies and humanities, and involves learners with varying levels of voluntary or mandatory engagement and degrees of exposure. Nonetheless, we have observed an exponential growth in the transversal competences proficiency and comprehension of sustainable goals among the diverse groups of learners at UPV (mainly male) and UniZd (mainly female).

## **VI. CONCLUSIONS**

We established a sustainability- and competence-based and development strategy for L2/3 university students. Once the project aims and focus were chosen (Step 1), organizational framework encompassed the stages of planning and design (Step 2), implementation (Step 3) and, finally, results and evaluation (Step 4). With the help of meaningful learning goals, we have demonstrated an innovative of layering didactic and research procedures in online collaboration.

By integrating these methods in the Sustainable Development Goals and transversal competences’ project, we provided a deeper insight into the complexity of virtual exchange structure and outperformed the initial methodological SAVL model. We also discovered that virtual exchange aimed at different education systems has encouraged

technical and humanities' undergraduates to be more creative, communicative, responsible and sensible.

In the light of the experimental findings, we can answer the original research questions:

RQ1 How could we relate Sustainable Development Goals to virtual exchange?

The relevance of sustainability issues is clearly by the SDGs 4 and 17. The two-tier project setting has undertaken quality education and partnerships as the core instruction area for mixed VE groups as well as self-assessment of achievement. The participant not only showed more positive appreciation of both goals, but also highlighted intercultural value of online interaction. In the end, this purposeful cooperation raised awareness among young of the importance of sustainability. The virtual component also fostered the mentoring role of lecturers and brought them closer to the learning community. Besides, the experience inspired both lecturers to apply for new didactic innovation projects.

RQ2 What are the possibilities for relating transversal competences to virtual exchange activities?

This project has illustrated the best practices of linking digital format of communication with general capacity building of university students. Even advancing positively in terms of TC1 (Social and environmental commitment), TC2 (Innovation and creativity), TC4 (Effective communication) and TC5 (Responsibility and decision-making), the learners spotted certain challenges in TC 3 (Teamwork and leadership). On the plus side, pre- and post-test results analysis has offered positive feedback on TC4 and related it to new ways of interacting with new people, discovering engaging topics and learning English.

RQ3 What is the most significant effect of virtual exchange experience in technical and non-technical/ humanities students?

This project was undertaken to develop a meaningful curricular practice and assess its outcomes. Its contribution to harmonising instruction and research options in online setting might be considered of importance by higher education stakeholders. Here we

would like to specify the initiative effect on each of the education community parts. For students, it is about enriching active learning process by their own abilities' assessment in addition to L2/3 and intercultural proficiency. For lecturers and researchers, there is a better connection of pedagogical innovations, scholarly techniques and online cooperation systems. For universities, it has to do with a new vision of deeper knowledge on integrating sustainability and competences in the training process through a direct implication of students, faculty and society.

Although the current study is based on a small sample of technical and language studies participants, the findings explore the potential of tailored modes of virtual co-education. Several other shortcomings such as certain incompatibility of schedules need for quality interaction within mixed groups, extra time required for organising and mentoring the exchange do not alter the values of the results obtained. Future work aimed at wider implementation of these types of collaborative experiences and search for feasible solutions for this set of issues should be done in the nearest future.

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