Revista Interuniversitaria de Formación del Profesorado
CONTINUACIÓN DE LA ANTIGUA REVISTA DE ESCUELAS NORMALES

ISSN0213-8646 | E-ISSN2530-3791

Kortazar Billelabeitia, P., Aguirregoitia Martínez, A. y Balza Tardaguilla, I. (2025). Sustainability and Storytelling in Primary English Teacher Training: A Study on Language and Professional Competence Acquisition. *Revista Interuniversitaria de Formación del Profesorado, 100*(NE), 149-164.

https://doi.org/10.47553/rifop.v100iNE.102894

# Sostenibilidad y narración de historias en la formación docente para Inglés de primaria: adquisición de competencias lingüísticas y profesionales

## Sustainability and storytelling in primary english teacher training: a study on language and professional competence acquisition

Paulo Kortazar Billelabeitia

Universidad del País Vasco/Euskal Herriko Unibertsitatea, https://orcid.org/0000-0002-3951-9163

Amaia Aguirregoitia Martínez

Universidad del País Vasco/Euskal Herriko Unibertsitatea, https://orcid.org/0000-0003-2465-5768

Irene Balza Tardaguilla

Universidad del País Vasco/Euskal Herriko Unibertsitatea, https://orcid.org/0000-0003-4102-3631

## Resumen

La educación es clave en el desafío global de la sostenibilidad. Por ello, los programas universitarios de educación deben promover el compromiso de los futuros docentes con la Agenda 2030 y proporcionarles las competencias, recursos y métodos necesarios para integrar la sostenibilidad en el curriculum. Este artículo analiza un proyecto interdisciplinar basado en competencias que utiliza metodologías de aprendizaje basado en proyectos (ABP) y aprendizaje basado en la investigación (ABI) con la narración de historias como elemento central. El objetivo es doble: desarrollar la competencia multilingüe de los futuros docentes y las habilidades transversales (superiores, interpersonales e intrapersonales) necesarias para reflexionar críticamente y tomar medidas para el desarrollo sostenible. La investigación con 61 estudiantes sigue una metodología de pretest y postest, sin grupo de control, y entrevistas a un grupo focal. Los resultados confirman la mejora en la selección de recursos (historias y materiales) para la educación en sostenibilidad, en el uso de técnicas narrativas, en el lenguaje académico oral y escrito, así como en habilidades investigadoras y competencias como el pensamiento crítico. El artículo concluye que integrar la narración de historias con ABP y ABI, fortalece el compromiso con la sostenibilidad y las competencias clave para su enseñanza.

***Palabras clave:*** Educación para la sostenibilidad; Storytelling; Metodologías activas; Habilidades de pensamiento de orden superior; Enseñanza de la lengua extranjera.

## Abstract

Education plays a decisive role in addressing the global challenge of sustainability. Therefore, university education degrees must aim to promote pre-service teachers' commitment to the

Agenda 2030 and equip them with the competencies, resources, and methods needed to embed sustainability in curricula. This paper examines the effectiveness of a cross-curricular, competency-based project that integrates Project-Based Learning (PBL) and Research-Based Learning (RBL), with storytelling as a central element. The project aims to achieve two main objectives: to enhance pre-service teachers' multilingual competence and to develop transversal skills—cognitive, interpersonal, and intrapersonal—required to reflect critically on sustainable development and take informed action. The research involves 61 students, uses a pre-test/post-test methodology, with no control group, and includes a focus-group interview. Results show improvements in participants' ability to select educational resources (stories and related materials), apply storytelling techniques, and use academic language effectively in both oral and written forms. Additionally, it supports the development of research skills and transversal competencies such as creativity, critical thinking, decision-making, communication, and teamwork. The findings suggest that combining storytelling with PBL and RBL methodologies strengthens future teachers' academic and communicative abilities, while also enhancing their engagement with sustainability and their acquisition of key competencies for sustainability education.

***Keywords:*** Education for sustainability; Storytelling; Active methodologies; Higher-order skills; Foreign Language Teaching.

## *Introduction*

Education plays a critical role in the achievement of the Sustainable Development Goals outlined in the United Nations Agenda 2030. It is urgent to propose a new educational model -that, following the principles of Education for Sustainable Development (ESD; UNESCO 2017), integrates the SDGs in learning and helps people "to develop the attitudes, skills and knowledge to make informed decisions for the benefit of themselves and others, now and in the future, and to act upon these decisions" (UNESCO, 2017). In response to this, the ESD is integrated into curricula as transversal competencies, which are taught across all subjects (e.g., Bertel et al., 2022). As a consequence, there has been a growing focus on the integration of sustainability principles into the realm of language education.

There is, however, no consensus on how to integrate ESD into language teaching. Incorporating sustainability into educational curricula, and in particular to language teaching, can be challenging, as teachers may lack the training and resources to integrate it effectively; in this sense, reorienting pre-service and in-service teachers to approach ESD in its content and its teaching and learning methods is considered an urgent need (Fischer, King, et al., 2022).

The work presented here aims precisely at evaluating the effectiveness of an interdisciplinary project, Stoires, that, in alliance with the University of the Basque Country's IKD-i3 strategy, seeks to promote pre-service primary and pre-primary foreign language teachers' compromise with sustainability and to equip them with the necessary competencies and resources to integrate sustainability in their foreign language lessons.

As reflected in its name, storytelling was chosen as the backbone of the project, since, beyond the demonstrated psychological and educational benefits of its use in young learners' education, it is also believed to provide promising potential to promote change towards sustainability: it helps learners to "better relate to the world they live in, to engage with the challenges they are facing, and to empower them to change this world for the greater good of all" (Fischer et al., 2020).

The project is devised as a series of tasks involving interdisciplinary teaching of transversal competencies, so, in addition to developing students' foreign language communicative skills, it aims to promote higher order skills (a. o. critical thinking, creativity, reasoned-decision making, and intra-personal and inter-personal skills), and the academic and research skills necessary for their professional development. In this regard, the project relies on active methodologies- mainly Project Based Learning (PBL/PjBL) and, to a lesser extent, Research-Based Learning (RBL), which facilitate interdisciplinarity and allow working on the resolution of real problems contextualised in their social, environmental and economic dimensions (UNESCO, 2022b), which is precisely the aim

of EDS.

### *State of the question*

In recent years, Spain has made strides in order to implement sustainability and to swerve education towards an educational scope that aims at offering quality education (SDG 4). To illustrate this point we may recall the fact that Spain has created a Ministry for Social Rights and Agenda 2030 while recently passing a new educational law in 2020, LOMLOE, that strives to include sustainability in the school curriculum while ensuring the acquisition of transversal competencies (Montero Caro, 2021; Negrín Medina & Marrero Galván, 2021). Similarly, the University of the Basque Country has adapted to this new context by launching the IKD+3 strategy (University of the Basque Country, n.d.) with the goal of promoting the redesign of its graduate courses by including transversal competencies and sustainability as the two pivotal elements.

It is within this framework that Stoires was designed and implemented to raise prospective foreign language teachers' awareness of the importance of integrating SDGs and sustainability into the syllabus, by using active methodologies and techniques that would ensure said integration, as well as to equip them with the educational context that they would find in their near future as pre-service teachers.

Among the resources deemed positive to warrant the integration between SDGs and FL teaching, storytelling was decided upon as a fit match considering the context: FL teaching in primary and infant education. Understood as the narration and dramatisation of a story with educational intentionality (Wall et al. 2019, p.1532), storytelling can both provide interaction with infant and primary students while simultaneously allowing for the construction of knowledge, thus, storytelling can be an enriching practice for EFL instruction (Barreras Gómez, 2010; Dahlstrom, 2014; Ellis & Brewster, 1991; Fitzgibbon & Wilhelm, 1998) and can also be implemented to address issues related with sustainability and multiculturalism (Hines, 1995), by illustrating, through narrative, otherwise abstract facts (Wilson, 2005 quoted in Fischer et al., 2020, p. 38). Moreover, storytelling has proven effective in developing young learners' social and emotional skills (Dujmović, 2006; Ellis & Brewster, 1991). It creates emotional closeness and generates dismay, which will lead to changes in behaviour (Fischer, Fücker, et al., 2022) and can build pro-sustainability attitudes in schoolchildren and teachers, as they contain powerful messages that "help build capacity in learners to act in a self-determined, competent way." It is a tool for teachers "to foster awareness, challenge assumptions, clarify values and ideas of what sustainability means and to empower individuals and groups to act accordingly" (Tasnim et al., 2023).

Along this line, Fischner, Fücker, et al. (2022) highlight four characteristics of storytelling which could help the audience engage with the complexity of sustainability. To begin with, storytelling offers the opportunity to increase attention, reduces cognitive effort in reception and provides means for overcoming cultural barriers. Second, narratives shed light on complex relationships. Third, storytelling provides an ideal platform for examining the value dimension of sustainability and the normative foundations of sustainability itself (such as intra- and intergenerational justice) and fourth, it helps audiences understand and empathise with other life experiences than their own.

As far as the learning of a foreign language is concerned, working on storytelling with pre-service foreign language teachers is shown to develop their oral skills, improving the use of word choice and fluency (Ramdayanti, 2023). When it comes to young learners, it provides a natural and interesting medium for language acquisition that can foster children to train their language skills in an entertaining and meaningful context while introducing and reviewing vocabulary and language structures gradually (Ellis & Brewster, 1991, p.2). In that regard, storytelling also provides the opportunity to introduce or revise input in the form of new words and structures (Dujmovic, 2006; Barreras Gómez, 2010) and to work on the four skills as well as vocabulary, fluency and communicative competence (Barreras Gómez, 2010) as well as pronunciation, phonation and diction (López-Cortijo, 2016; Díaz, 2016). Additionally, storytelling can foster motivation among young learners and help them develop positive attitudes towards the foreign language (Dujmovic,

2006; Barreras Gómez, 2010, Combariza et al., 2013; Dahlstrom, 2014). Recent experiences have shown that "storytelling within the subject of English as a foreign language, had a lot of transcendence and creative value, it generated in the students the interest of learning something new and interesting in the pronunciation of English speech, placating the fear of producing it in front of their classmates, in the same way, the English teachers expressed the pleasure of learning digital resources to transform the teaching and learning of their students whose results allowed testifying the need for research (Chavez-Suarez et al., 2020).

From a methodological perspective, Stoires project was mainly devised as a PBL experience (although it also exploits RBL in some of its tasks), in line with the University of the Basque Country's commitment to active methodologies. The motivation for this methodological choice is rooted in the demonstrated positive effect of PBL for effective language teaching, but also for enhancing students' awareness and engagement with sustainable development issues (De la Fuente, 2022) and developing transversal competencies (Bell, 2010; Gultekin, 2005).

Both PBL and RBL share a common trait: working and collaborating towards an end product (Lambert, 2009). With regards to RBL, this methodology creates inquiry-based contexts that demand that students undergo the process of designing and carrying out research (Lambert, 2009). PBL provides a learning experience in which learners plan, carry out and may also assess projects that often have a real-world application (Blank & Harwell, 1997), as is the case with the Stoires project, which incorporates the problem-solution structure where the teacher presents a particular case and the students, through a cooperative process and information search, try to find the best solutions to solve the case in question. Undoubtedly one of the characteristics of PBL methodologies is the need to work as a team, where each member will use his or her special skills to reach the best solution together. Under this methodology, learners undergo the process of "solving real problems through asking and refining questions, designing and conducting investigations, gathering, analysing, and interpreting information and data, drawing conclusions, and reporting findings" (Blumenfeld et al., 2000, p.150).

PBL brings improvements to areas such as communication and research and problem-solving, by developing high-order thinking skills such as creativity, intellectuality, critical thinking, teamwork skills, etc. (Bell, 2010; Dogara et al. 2020; Gultekin, 2005; Termizi, 2014), as it provides "an opportunity for hand-on training, solving real problems, gainful interaction, and collaboration/teamwork for the integration of soft skills among students" (Dogara et al. 2020, p. 83725). It also develops their ability to "share and understand ideas and understand ideas, use multiple representations to present those ideas and be more receptive to perspectives different than their own" (Owens & Hite, 2022, p. 76).

Concerning FL learning, PBL shows positive effects on learners' language skills as it involves students in an authentic environment that allows them to use the language in real-life situations, at the same time that it provides learners with opportunities to recycle known knowledge and skills (Haines, 1989). Looking to exploit this advantage, the final task of the project was designed to recreate a relatively authentic context: a public poster presentation session in the students' faculty. Presentations provide students with realistic language tasks close to real language use and an opportunity to develop communicative skills (Brooks and Wilson, 2014). Research shows that PBL using presentation has significant effects on students' speaking skills and was positively rated among students (Sirisrimangkorn, 2021); as a matter of fact, Indonesian students who were taught through PBL using E-poster significantly outperformed those who were taught through a conventional method, regardless of students' personality types (extrovert and introvert) (Winasih et al., 2019). The success of this activity also depends on providing students with scaffolding activities where they are given the necessary language and information before working on the speaking activities, and with a cooperative learning environment that encourages them to cooperatively complete the task (Sirisrimangkorn, 2021). Additionally, PBL is particularly convenient for developing students' writing abilities, as it offers opportunities to produce specific genres: reports, abstracts, data analysis, literature reviews… (Allen et al., 2011); the integration of writing as a core activity of PBL and RBL has demonstrated strong learning outcomes in the process (Alaimo et al. 2009, cited in Allen et al. 2011).

## *Methods*

This study seeks to shed light on whether interdisciplinary PBL projects based on storytelling can promote a pro-sustainable attitude of pre-service infant and primary foreign language teachers and, at the same time, equip them with resources and skills to integrate ESD in their classroom practice.

The project aims at the completion of the following four objectives:

O1. To develop pre-service teachers' awareness of the potential of storytelling for sustainability, and to train them in the application of (i) criteria to select suitable stories and (ii) effective storytelling techniques.

O2. To develop research and academic skills to divulge the research carried out in the project through the production of academic texts.

O3. To develop their oral and written multilingual competence in academic and professional contexts and to raise intercultural awareness.

O4. To develop the necessary higher-order skills (creativity, ideation, critical thinking, problem-solving…) and intra- and interpersonal skills to work on sustainability-based interdisciplinary collaborative projects.

The set of tasks that students had to complete in groups during the project are described in Table 1.

**Table 1**
*Set of tasks involved in the project*

| |
|---|
| 1. Carry out research on sustainability and select picturebooks in English. |
| 2. Create a portfolio with a collection of picturebooks. |
| 3. Record a storytelling video of one of the picturebooks applying the techniques. |
| 4. Assess other students' videos and receive feedback on their own videos to improve them and create a second version. |
| 5. Elaborate a diagnostic report of their pronunciation problems following the scientific method (careful observation, hypothesis development, experiment design, data analysis and conclusion drawing) reflecting on the pedagogical implications for their future pupils and providing specific didactic proposals to work on the difficult sounds. |
| 6. Prepare an academic report to justify their proposals on storytelling and sustainability. |
| 7. Prepare and present an academic poster in groups. |
| 8. Adapt one of the picturebooks to create and storytell an abridged version in French. |

To evaluate the effectiveness of the project in relation to these objectives, a quasi-experimental study was carried out with the whole group of students using a pre-test/post-test methodology, with no control group, which was complemented with a focus-group interview.

The sample consisted of 64 students of the Foreign Language minor, of which only 61 were considered valid respondents either due to errors or incomplete questionnaires. The selection of the sample was decided upon consideration of the following factors: as undergraduates of a degree in primary education and future foreign language teachers in primary classrooms, upon graduating, the bulk of the participants will be responsible for teaching foreign language and fostering sustainability in primary classrooms. Furthermore, the Faculty of Education where the study was carried out is presently the faculty that produces the highest number of graduates in the northern region of Spain, and thus can provide a measure of the profile of the future foreign language teacher.

The pre- and post-tests are competence-based and a more detailed description of them is offered in Table 2 in the Results section. After receiving informed consent these questionnaires were distributed in the classroom at the beginning and upon course completion. They were filled in anonymously, individually, and in presence of one of the teachers, who would answer potential

questions. The tests comprised 25 questions about the undergraduates' initial knowledge of SDGs and varied competencies (related to methods, research skills, linguistic competence, academic skills, etc.). The same items were used after the experience to provide information for a pre-and-post analysis.

Cronbach's alpha has been used for the reliability measurement of the tool, and its internal consistency has been tested obtaining values of alpha= 0.85 and alpha=0.87 for data from the pre and post-tests respectively.

Internal consistency of the tools and statistical analysis have been carried out using Excel. A paired sample t-test was done to detect improvements in the items under evaluation before and after the experience and identifying those mean values that have improved significantly. At the same time, it aimed to identify weaknesses by detecting items that either did not augment significantly after the experience or improved only slightly and, therefore, are susceptible to enhancement.

## *Results*

Table 2 displays the data collected regarding students' self-perception of the competencies on a scale from 0 to 10 across 25 diverse items before and after the experiment. The students' responses indicate that they believe they have improved in every item in the questionnaire. The difference between the mean values in the pre-test and post-test is positive for each aspect analysed.

**Table 2**

*Self-assessment of students' competencies before and after the experience*

| ITEM | Mean Pre-T | Mean Post-T | Mean (Dif.) | Std. Dev. Pre. | Std. Dev. Post. |
|---|---|---|---|---|---|
| 1. Ideation /creativity. Generate ideas in the context of an educational challenge. | 7.66 | 8.39 | 0.73 | 1.12 | 0.82 |
| 2. Idea implementation. Turn creative ideas into educational proposals. | 7.47 | 8.18 | 0.71 | 0.88 | 0.91 |
| 3. Critical thinking. Reflect to make informed judgments and decisions. | 7.58 | 8.39 | 0.81 | 1.09 | 1.01 |
| 4. Reasoned decision-making. Use reasoning to make judgements and decisions in an educational challenge. | 7.61 | 8.29 | 0.68 | 1.06 | 0.98 |
| 5. Organisational skills (organise, administer, break into smaller tasks). | 7.81 | 8.40 | 0.60 | 1.37 | 1.14 |
| 6. Teamwork skills. Work with others towards a common goal. | 8.31 | 8.89 | 0.58 | 1.11 | 0.79 |
| 7. 1. Intrapersonal skills. Manage workload efficiently; independently exercising control over my learning. | 8.02 | 8.52 | 0.50 | 1.14 | 0.94 |
| 7.2. Intrapersonal skills I can cope with stress, manage expectations and self-limitations. | 7.39 | 7.47 | 0.08 | 1.49 | 1.33 |
| 8.1. Research methodology. Search for information in academic sources, evaluate and organise it. | 7.74 | 8.60 | 0.85 | 1.12 | 0.97 |
| 8.2 Research methodology (write research objectives, formulate hypotheses, analyse data, draw conclusions). | 7.21 | 8.06 | 0.85 | 1.10 | 0.97 |
| 9.1. Academic skills (write an academic paper, design a poster, present it orally) | 7.16 | 8.35 | 1.19 | 1.26 | 0.96 |
| 9. 2. Academic skills (to use, cite and reference following APA style guide). | 7.18 | 8.02 | 0.84 | 1.56 | 1.32 |

| | | | | | |
|---|---|---|---|---|---|
| 10. Use of ICTs to search for academic sources, to present information. | 7.92 | 8.52 | 0.60 | 1.16 | 1.04 |
| 14. Produce clear, well-structured and accurate oral and written texts on topics of a certain complexity. | 7.15 | 8.21 | 1.06 | 1.11 | 0.94 |
| 15. Read and comprehend complex texts, understanding the cultural nuances of literary elements. | 7.42 | 8.35 | 0.94 | 1.24 | 0.93 |
| 16. Express oneself fluently and spontaneously and respond to questions. | 6.98 | 7.98 | 1.00 | 1.19 | 1.14 |
| 17. Effective use of non-verbal communication skills. | 7.40 | 8.11 | 0.71 | 1.23 | 0.98 |
| 18. Awareness of pronunciation errors and knowledge of how to work on them. | 7.35 | 8.00 | 0.65 | 1.29 | 1.17 |
| 19. Knowledge of a collection of suitable stories/ picturebooks for the classroom. | 5.45 | 8.90 | 3.45 | 1.94 | 1.08 |
| 20. Awareness of the relevance of using picturebooks and stories. | 7.81 | 9.06 | 1.26 | 1.38 | 1.02 |
| 21. To be able to apply varied techniques to use picturebooks in the classroom. | 6.58 | 8.71 | 2.13 | 1.75 | 1.03 |
| 22. To be able to select suitable texts and picturebooks for the classroom. | 6.95 | 8.63 | 1.68 | 1.59 | 1.00 |
| 23. Je suis capable de lire un texte simple en français avec une prononciation correcte. | 2.92 | 6.65 | 3.73 | 2.17 | 2.17 |
| 24. Je suis capable d'écrire un texte simple en français. | 2.26 | 6.13 | 3.87 | 1.87 | 2.19 |
| 25. Je suis capable de comprendre un texte simple écrit en français. | 3.65 | 7.52 | 3.87 | 2.46 | 2.10 |
| 21. To be able to apply varied techniques to use picturebooks in the classroom. | 6.58 | 8.71 | 2.13 | 1.75 | 1.03 |

*Note.* All the items except for 7.2 (p value=0.67) are highly statistically significant (p<0.001).

To describe the data presented in Table 2, the values of the pre-and post-test of the most relevant items will be analysed using a paired sample t- test, with a degree of freedom of 60 and a significance level of alpha=0.05. This test compares the before-and-after data values for each measurement of the same group of people. Also, the values of the differences between the paired measurements should be normally distributed. Using the paired sample t-test, the statistical analysis shows that all the items except one have p-values below 0.05, therefore, there is sufficient evidence of a statistically significant difference between the average scores before and after the test. To mention but a few, for items 6 and 7.1, which have the lowest deviation, the p values are p=0.0007 and p=0.0028 respectively.

Exceptionally, item 7.2, about the effect of learning how to cope with stress and manage expectations and self-limitations, does not improve significantly after the project (p= 0.67). This can be explained because the project does not focus particularly on these skills, and they are expected to be developed transversally as a consequence of working on the tasks.

About the first objective, "To develop awareness of the potential of storytelling for sustainability, and to train them in applying (i) criteria to select suitable stories and (ii) effective storytelling techniques" the results indicate a significant improvement.

The initial task assigned to students was creating a collection of picture books. This activity has positively impacted both their knowledge of potential stories for the classroom and their criteria for selecting suitable texts and picturebooks. During the focus group sessions some students said that "at the beginning, when selecting the picturebooks we had problems with the topic, we didn't know which books to select". P-values obtained for items 19 and 22 are both less than 0.001. About these items, the mean value has increased by 3.45 points and 1.68 respectively. Figure 1 and Figure 2 present the box and whisker charts for each variable.

Likewise, the instruction on varied storytelling techniques, the video recording and the peer assessment of their productions have also been reported as an effective means to learn how to apply gestures, images, realia, use of voice, intonation and rhythm to tell stories in the classroom. In the case of item 21, the p-value is less than 0.001 and the mean value has increased by 2.13. Furthermore, the data suggest a decrease in variance, with a standard deviation of 1.03 after the intervention. Item 20, related to raising awareness, also shows a highly significant improvement ($p<0.001$) and an increase by more than one point (1.26).

**Figure 1**

*a) Knowledge of a collection of suitable stories/picturebooks for the classroom. Pre and Post. b) Ability to select suitable texts and picture books for the classroom. Pre and Post*

a) b)

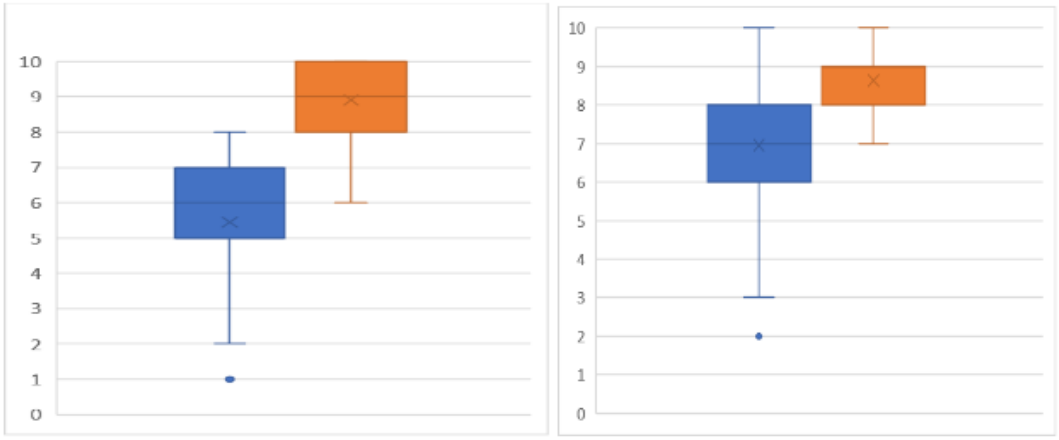
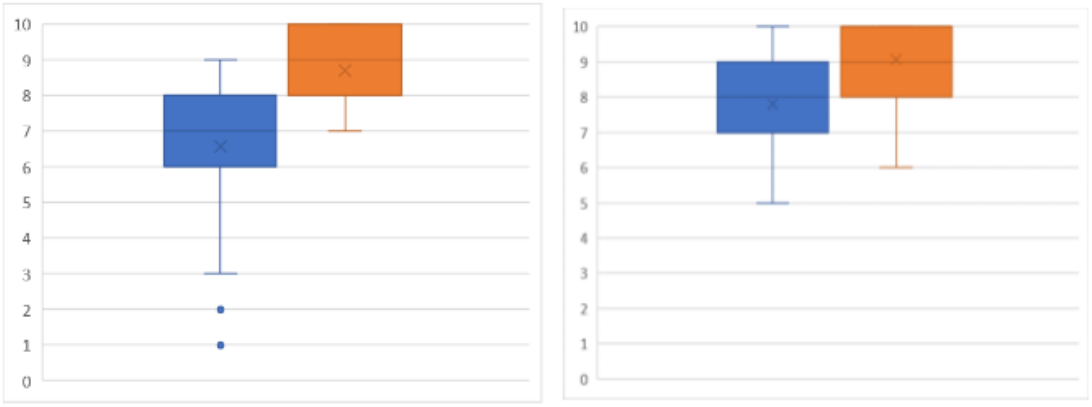



**Figure 2**

*a) Ability to apply varied techniques to use picture books in the classroom. Pre and Post. b) Awareness of the relevance of using picturebooks and stories. Pre and Post*

a) b)




These results are backed by the students' feedback in the focus group. Regarding story selection, the workshop that initiated the project and the participation of educational experts in the said workshop were deemed satisfactory. The feedback provided by the professors during the project was also considered beneficial by the students. Regarding storytelling techniques, watching the educational experts perform their storytelling sessions during the workshop was very helpful from the undergraduates' perspective. The opportunity to make two versions of a storytelling session

and compare them received a mention on a positive note from students in the focus group ("Comparing the two recordings was very useful" "The fact that we had a first version of the recording, and the feedback to improve it for the second version has been the best to improve our techniques") as it made them aware of which were the most appropriate techniques. As an improvement, a student mentioned that " It would be great to do the storytelling session in a real classroom".

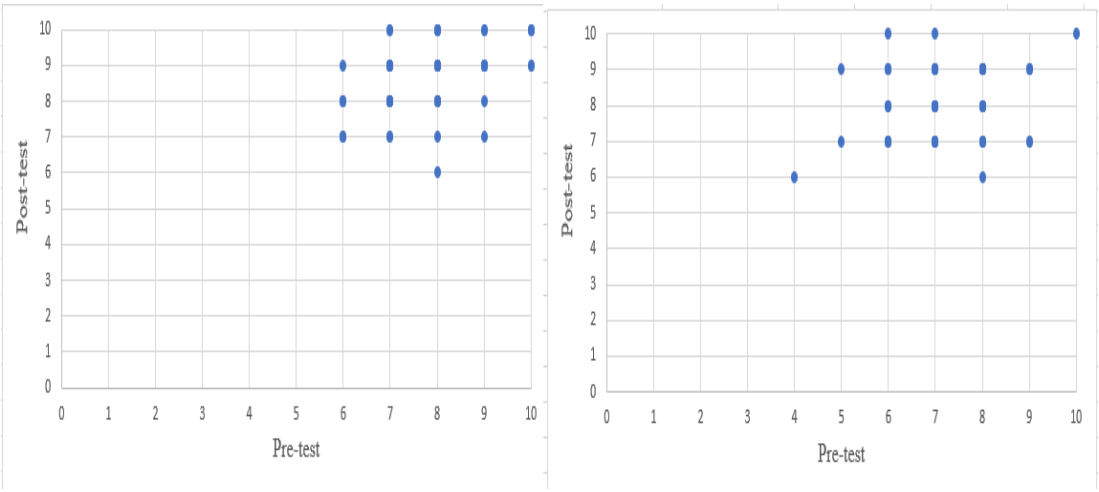
As for the second objective "To develop research and academic skills to divulge the research carried out in the project and produce academic texts", students were required to use research methodologies and academic skills to search for information across various academic sources, justify their proposals, and prepare complex oral and written compositions.

As for research skills (Items 8.1 and 8.2), results point to a substantial and statistically significant improvement with a p-value of less than 0.001. The mean values for both items have increased by 0.85, while the standard deviation has slightly decreased from 1.16 and 1.13 to a more uniform value of 0.94 for both items. The scatterplot for both items is depicted in Figure 3.

**Figure 3**

*a) 8.1 Research methodology. Capability to search for information in academic sources, evaluate and organise it. b) Research methodology II. Write research objectives, formulate hypotheses, analyse data, and draw conclusions*

a) b)




Concerning academic skills, students have indicated significant improvements, particularly in their aptitude for writing academic papers (Items 9.1) and generating coherent texts (item 14). Additionally, they have expressed enhanced abilities in effectively articulating their thoughts and addressing questions related to their research (item 16). These items show a statistically highly significant improvement of $p<0.001$. Moreover, their mean value has increased by more than one point. The standard deviations after the experience are 0.92, 0.87 and 1.3 respectively, indicating a lower dispersion compared to the pre-test. Hence, it can be concluded that engaging in activities such as writing an academic paper, creating a poster, and delivering an oral presentation has yielded a positive effect, not only in terms of learning the presented contents (SDGs and picturebook selection) but also in the development of the aforementioned academic skills. Figure 4 shows the box and whisker chart for the three variables.

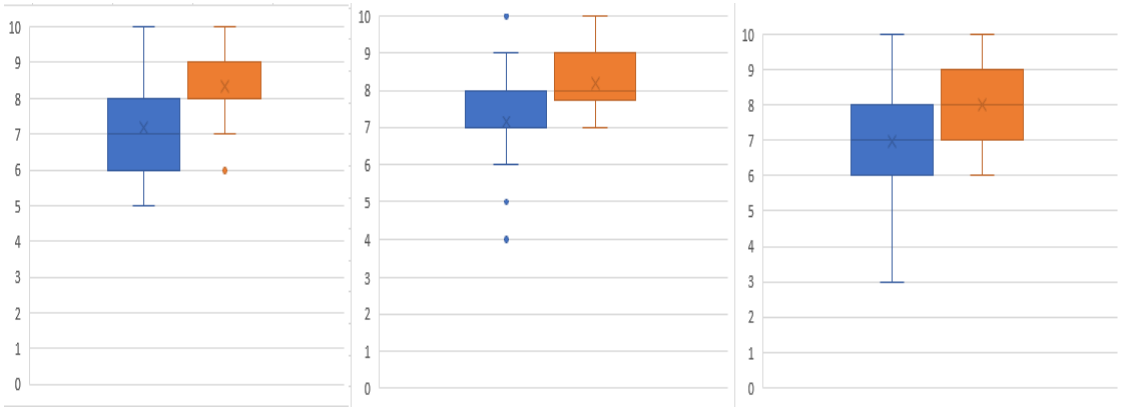
The focus group also highlighted their increased development of research skills, which was deemed useful for the end-of-degree dissertation that the undergraduates had to complete only four months after the completion of the project. Students mentioned that "now we know

However, despite the fact that they also supported the good results evidenced in the post-test with regard to academic skills, there was some criticism concerning the poster presentations: a few students felt uncomfortable with the venue (the faculty's open free-access space on the ground floor), reporting that it added an extra degree of stress.

**Figure 4**

*a) 9.1 Academic skills (write an academic paper, design an academic poster, present it orally ) Pre and Post*
*b) 14. Produce clear, well-structured and accurate oral and written texts on topics of a certain complexity. Pre and Post*
*c)16. Ability to express myself fluently and spontaneously and to respond to questions. Pre and Post*

a) b) c)




The third objective of the project was "To develop their oral and written multilingual competence in academic and professional contexts, and to raise intercultural awareness". In this regard, in addition to the aforementioned significant increase in their written and oral skills (Items 14 and 16), the benefits concerning undergraduates' non-verbal communication skills were also notable (with a difference of 0.71 points between the pre-and the post-tests means). Nonetheless, a student in the focus group complained about the few opportunities they were given to develop their spontaneous communicative skills. In addition, undergraduates lamented that, because the alumni were divided into groups, the communication with the professors took place mainly on a group spokesperson-professor basis, and typically, the least skilled students participated less in this dynamic.

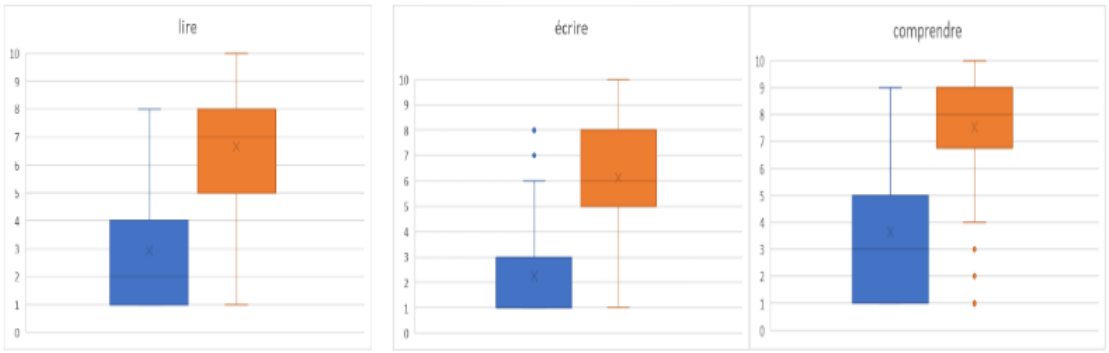
Regarding their English pronunciation, students reported that, after analysing the productions by their classmates and receiving feedback on their storytelling video, their self-evaluation of their pronunciation skills improved, though moderately (by 0.65 points), and that they were more aware of their errors (item 18). Along the same line, the focus group pointed out the positive effect that phonological awareness had on their pronunciation skills (item 18), which reportedly allows them not only to notice the mistakes themselves and their classmates make and to work on correcting them but also to anticipate the potential difficulties of their future students concerning English pronunciation. In their own words: "It was difficult for us (vowels, especially). We do not usually work on pronunciation, but now we are more aware of the way they say things" , "It has been very helpful to listen to and correct our classmates"

Significant progress in French proficiency deserves particular recognition. Table 1 highlights that the three items related to the French language (items 23, 24 and 25) have shown the most substantial improvement. Their mean value has increased by 3.73, 3.87 and 3.87 respectively. The noticeable improvement in French proficiency can be attributed to the initial low proficiency level of the students in that language.

It should be noted that, during the focus group, some students viewed the inclusion of French as somewhat forced, and their facial expressions during the project presentation showed surprise at the challenge they had to face (adapt and tell a story in French). In fact, there were initial doubts about the suitability of including this language- which is a L4 for our students- in the project, because students start from an A1 level and perhaps they would not be capable of reaching a proficiency level where they could tell a brief and adapted story. However, in the end, it has been one of the aspects that they have valued the most in terms of acquired learning. It has also allowed them to experience emotions similar to those felt by primary school students when they listen to and have to use English, a language in which they are not proficient. As an

example, one of the students said: “Creating short stories so we can improve on how to write in French and integrate them in the project/ Learning a language from scratch helps us understand how children will feel when listening to English”. Another student proposed that ”the proficiency in French is so low that it was difficult, maybe we could do something like micro stories in French”.

**Figure 5**
*Perceived progress in reading, writing and understanding basic texts in French*




Interestingly, students perceived an increased reading comprehension ability and understanding of the cultural nuances of literary elements (Item 15), by 0.94 points. In this regard, the focus group highlighted that the project contributed to raising global and intercultural awareness. As noted by one of the students, the fact that SDGs have been devised by the UN bearing in mind global problems means dealing with issues that affect diverse cultures connects the primary class with them. She summarised the benefits of the project with the following statement: “We have learned how to work on those problems throughout stories” ”You bring problems from all around the world to the classroom”.

Finally, regarding the fourth objective- To develop the necessary higher-order skills (creativity, ideation, critical thinking, problem-solving…) and intra- and interpersonal skills to work on sustainability-based interdisciplinary collaborative projects-, the results are uneven. Whereas the items measuring students’ perception of higher order skills such as critical thinking (item 1), ideation and creativity (item 2), idea implementation (item 4) and reasoned decision making (item 4) show notable growth (with pre/post-test differences that go from 0.68 to 0.81), those concerning intra- and inter-personal skills show the slightest (but still significant) progress. Exceptionally, item 7.2. (coping with stress) presents no significant differences.

When questioned about these aspects, the focus group coincided with the significant improvement perceived concerning their reasoning skills, underlying how the project had pushed them to learn how to justify their decisions when using storybooks for storytelling or sources for academic research. As for the lowest rated item (7.1.), the focus group pointed at the stress created by the workload and the diversity of tasks of the project, combined with the fact that some of the assignments (e.g. pronunciation analysis) and the nature of them (e.g. using formal English) were new for the alumni. The modestly better results obtained by the items related to organisational and teamwork skills (5 and 6) were also supported by the focus group students, who declared that the project had forced them to think in detail about the organisation of the workload and group management.

## *Discussion*

This study has contributed to evidence that interdisciplinary PBL projects like STOIRES, with a focus on storytelling, not only serve to promote a proactive attitude of pre-service teachers

towards sustainability but also provide them with suitable criteria to select resources and valuable techniques to integrate the SDGs of the Agenda 2030 in the pre-primary and primary foreign language curricula. Along the line of recent studies (Fischner, et al. 2020; Fischner, Fücker, et al., 2022; Tasnim et al. 2023), working on storytelling has demonstrated promising benefits for raising awareness and inviting reflection and engagement among undergraduates. However, the selection of stories and their suitability become major decisions for teachers to make, and it is essential to provide students with a conceptual framework for analysing the suitability of stories in teaching sustainability (Tasnim et al., 2023). Thanks to the project, pre-service teachers have gained confidence in their ability to select and adapt stories for infant and primary school children. Furthermore, the acquired scaffolding techniques for storytelling have contributed to "build on the context, concept and content" essential to foster pro-sustainability attitudes and values in infant and primary schoolchildren, as shown in Tasnim et al.'s (2023) investigation.

In the same vein, the study demonstrates that the creation of storytelling videos can positively impact the non-verbal and verbal skills of the pre-service teachers, which matches the findings of recent research showing how TELF pre-service teachers significantly improved their public speaking competencies through digital storytelling (Zhussupova & Shadiev, 2023). The study further confirms how storytelling can serve to develop students' phonological competence (see also Díaz, 2016). What is more, the research-based activities carried out by students when analysing their storytelling video recordings proved particularly convenient to make them aware of their pronunciation errors and the difficulties posed by the contrastive differences between their L1 and English, despite the fact that it was regarded as highly exigent.

A perceived drawback of the project, regarding language learning, was that it failed to provide students with opportunities for individual spontaneous speech. This was not initially conceived as an objective of the project, however, it would be desirable to incorporate some tasks involving informal spontaneous spoken interaction in future academic years. This will also help develop the trainees' interpersonal skills (Thornbury & Slade, 2006, p. 25). In this regard, we are seriously considering the possibility of implementing virtual exchange practice with native undergraduates of the same field, thus encouraging students to carry out casual conversations to share their learning experience and feelings, and help them improve their spontaneous oral skills and intercultural communicative competence (Dooly & Vinagre, 2021).

The inclusion of research-based activities within the project - such as the bibliographic search carried out about the stories collection, or the diagnosis of the students' storytelling recordings (which involved the application of the scientific method: formulation of hypotheses, data analysis, etc.)- demonstrates the advantages of this type of student-centred active methodologies for the development of higher-order professional and academic skills, along the lines of previous studies (Bell, 2010; Dogara et al., 2020; Gultekin, 2005; Termizi, 2014). Likewise, the reported improvement of the students' oral and written academic language, when asked to divulge their research in several academic and scientific written and oral texts (reports, presentations, posters…), supports the good results obtained in similar research experiments (Allen et al. 2011, Sirisrimangkorn, 2021). In this respect, the specific instruction and scaffolding received by students in terms of effective discursive techniques, useful language (keywords, academic vocabulary) and non-verbal communication skills (facial and body expression, use of voice…) has proved highly beneficial, as also pointed out by Winashih et al. 2019.

The project has less noticeably fostered the enhancement of intra-personal skills among students, in particular, in regard to their ability to cope with stress and manage the workload. This need not call into question the advantages of PBL and RBL reported in previous research on this concern, but it might just be indicative of the students' need for further support. In fact, previous studies in which PBL was also shown to be demotivating regarding "the students' anxiety about relying on their abilities to complete the project and the necessity of their attendance contributing to the project's success" suggest that "students need some structure and control in balance with autonomy for PBL to more effectively motivate students" (Ford & Kluge, 2015, p. 121). In this respect, conversations have been held among the professors to reduce assessment-related anxiety, by fusing some assignments and ensuring a better

distribution of the workload. It is also deemed important to aid students during planning and performance by teaching them useful metacognitive strategies and to provide students with opportunities to reflect individually and in groups, to help them self-regulate and monitor their growth.

Considering that the study has been carried out on Faculty grounds and in the final year of the degree in Primary Education Teaching, a potential line of research could consist on observing the internship periods of the participants at primary schools. Carrying out said observations could yield critical data on the effectiveness of the storytelling and sustainability-related STOIRES project from a practical perspective. In particular: how often do pre-service teachers actually implement storytelling in the classroom and measure whether that successfully promotes sustainability awareness. In addition, in this study, the sample is limited to students from a single Faculty. Hence, a comparative study to replicate the experiment contrasting the results obtained with a control group or a wider range of students could yield additional and interesting information.

### *Ethical Considerations in the Research and Use of Artificial Intelligence*

This study was based on anonymous data collected through an online questionnaire with no personal or identifiable details requested. Participants were provided with a clear explanation of the project and the purpose of the data, which has been used exclusively for academic research purposes. They were free to stop completing the questionnaire at any time. No compensation or incentives were offered, and all participants were adults.

Artificial intelligence tools were not used at any stage of this research, including its conception, data analysis, or manuscript preparation.

### *Acknowledgements and Funding*

The present research has been made possible thanks to the funding of the project “STOIRE+i3 Stories across borders TO Improve REality/ Mundua Eraldatzeko Mugaz Haraindiko Istorioak” (no. ref. i3 22-35) by the IKD i3 project under the supervision of the Service for Educational Consultancy (SAE/HELAZ) Vicedean’s office for Degrees and Education Innovation at the University of the Basque Country.

### *Conflicts of interest*

The authors declare that they have no conflicts of interest. The funding sources had no involvement in the study’s design, data collection, analysis, or interpretation, nor in the writing of the manuscript or the decision to publish the findings.

### *Author contributions*

All authors were actively involved in every stage of the project, including its conceptualization, data collection, analysis, and manuscript preparation. Dr. Irene Balza contributed notably to project coordination, funding acquisition, and the overall strategic direction of the research. Dr. Kortazar and Dr. Aguirregoitia played key roles in shaping the manuscript, particularly in drafting and revising its final version. All authors collaborated closely throughout the process and have read and approved the published version of the manuscript. All authors confirm that they have read and approved the published version of the manuscript.

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