Research Article https://doi.org/10.12973/ijem.12.2.149

International Journal of Educational Methodology
Volume 12, Issue 2, 149 - 163.
ISSN: 2469-9632
https://www.ijem.com/

Academic Development in Sustainability-Oriented Learning Environments: A Qualitative Case Study of the Ocean i3 Project

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Received: March 3, 2026 ▪ Revised: April 15, 2026 ▪ Accepted: April 28, 2026

Abstract: University teaching staff are increasingly engaged in innovative sustainability-related initiatives aimed at improving teaching-learning processes while fostering their own academic development. However, the literature has only tentatively explored the impact of this participation on academic development. This work, therefore, aims to analyse the dimensions of the sustainability-oriented learning environment known as Ocean i3 that influence the academic development of university teaching staff. It is based on a case study approach that enables an in-depth and contextualised analysis of this complex phenomenon in a real-world setting. Interviews and a focus group were used as data-collection instruments while inductive content analysis guided the interpretation and discussion of the findings. The results suggest that the complexity of the educational choreography—including project design, institutional context, the teaching team, and the active involvement of staff and students— plays a key role in the academic development of university teaching staff. The study concludes that these dimensions should be strengthened in innovative sustainability-oriented learning environments in order to promote teachers' academic development.

Keywords: *Academic staff development, innovation in higher education, challenge-based learning, sustainability-oriented environments, qualitative case study.*

To cite this article: Rekalde-Rodríguez, I. (2026). Academic development in sustainability-oriented learning environments: A qualitative case study of the Ocean i3 project. *International Journal of Educational Methodology*, *12*(2), 149-163. https://doi.org/10.12973/ijem.12.2.149

Introduction

Since 2000, there has been a strong push for teachers' training. This was driven by changes linked to the European Higher Education Area and a growing concern for contextualised professional development. This approach considers factors such as institutional organisation and teachers' academic development (Drummond-Young et al., 2010; Taylor & Colet, 2010). In this sense, educational practice and its improvement are linked to the quality-oriented transformation of the organisation (Sorcinelli et al., 2005). Rather than being understood as a mechanical or transmissive act, it is a process aimed at generating knowledge together with students, other teachers, and professionals (Boyer, 1990). Moreover, this practice is understood as an ongoing process of action-research (Kreber & Cranton, 2000). In this practice, research into the teaching process itself and the students' learning allows training activities to be developed and improved, resulting in an academic teaching practice (Boyer, 1990). In this framework, educational innovation plays a very important role; universities promote innovation with the aim of encouraging their teaching staff to analyse and reflect on their teaching practices as a way to improve student learning and the institutions as a whole (Schophuizen & Kalz, 2020), while providing added value for the community (García Correa, 2011).

Educational innovation has received considerable attention in the literature, particularly in relation to its impact on student learning and the development of teaching methodologies (Díaz-López et al., 2023; Papaioannou et al., 2023). In contrast, little research has specifically analysed its influence on teachers' academic development (Jiménez-García et al., 2025; Vermunt, 2026) and even less attention has been paid to this issue on Education for Sustainable Development (ESD) settings (Bascopé et al., 2019; Fischer et al., 2022).

In this regard, examining ESD contexts is essential to better understand its influence on teachers' academic development.

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The Ocean i³ project, promoted by the University of the Basque Country (EHU, Spain) and the University of Bordeaux (Nouvelle-Aquitaine, France), represents a sustainability-oriented learning environment that can be defined as interdisciplinary, cross-border, and intercultural (Rekalde-Rodríguez et al., 2021). This project, funded by the European Regional Development Fund (POCTEFA, 2014-2020), aimed to promote sustainable development related to the blue economy along the cross-border coastline. In this context, the students' academic work was carried out within a multidisciplinary community, which involved regional stakeholders. The work addressed a challenge related to an environmental and social issue: the need to reduce plastic pollution along the Basque-Nouvelle-Aquitaine coastline (Rekalde-Rodríguez et al., 2023). It reflected the commitment of both universities to the Sustainable Development Goals (United Nations, 2015) and was based on a teaching model adopting the principles of ESD (UNESCO, 2014, 2017), and the *Challenge-Based Education* methodology (van den Beemt et al., 2023) promoted by European university consortium *ENLIGHT*. Within this innovative, sustainability-oriented learning environment, the following questions were central to this research: 1) How did Ocean i³ contribute to teachers' academic development? 2) How did their participation in this environment benefit them as teachers? 3) What factors facilitated or hindered their academic development?

In this sense, the aim of the study was to analyse the dimensions that the teachers participating in Ocean i³, an innovative sustainability-oriented learning environment, perceived to have influenced their academic development.

Literature Review

The fact that university professors engage in continuous training is not new. Neither is the fact that their academic careers involve ongoing professional development through different activities. It is also unsurprising that the functions they perform are highly diverse in nature. University teaching staff generate knowledge through research, transmit it through teaching to future professionals, and disseminate it to society in order to support informed decision-making to contribute to social, cultural, and environmental improvement. In fact, university teaching staff are immersed in a process in which they have to respond to societal demands This, in turn, influences their work by helping them adapt to continuous change while highlighting singularities associated with different social and university contexts in which their professional practice takes place (Tierney & Lanford, 2018). What is clear is that societal and university expectations from teachers influences their academic development (García-Lázaro et al., 2020). Moreover, expectations and demands placed on university teachers change over time, binding them to a continuous training and development process (Sorcinelli et al., 2005).

Today, the concept of professional development, understood as a term that considers the teacher independently of the context, the organisation, or other influencing factors, has been replaced by the concept of academic development, as a form of contextualised professional development that also emphasises the development of the organisation itself (Drummond-Young et al., 2010; Taylor & Colet, 2010). The goal of academic development is always transformation aimed at achieving quality organisation and processes through individual influence (Sorcinelli et al., 2005). However, as Breslow et al. (2004) point out, regardless of the reasons driving academic development, real transformation will not occur unless teachers' personal curiosity is aroused rather than mere responses to external demands.

Sorcinelli et al. (2005) showed that, over time, the academic development of university teachers is increasingly conceived in broader terms and as subject to multiple factors affecting their progress. Furthermore, the role of the context is highly significant in shaping what is expected of teachers and can only be understood through the interpretation and dialogue that is established with their own environment (Hénard & Roseveare, 2012).

Delving into context, it is interesting to note how Ryan et al. (2004) distinguish between macro- and micro- contexts. The macro-context refers to the socio-political context that largely influences teachers (socio-economic forces, globalisation, technological changes, student expectations, etc.). On the other hand, the micro-context is made up of factors that are situated within and influence the teacher's immediate environment (the functions and tasks to be carried out, the help or lack of support from the head of department, the geographical location, the position within the university structure, the rewards for their activities, etc.). Ultimately, academic development is feasible through genuine teacher involvement (Day, 2005) and organisational support for strategic change that is recognised and rewarded (Loads et al., 2019).

As Feixas and Euler (2012) recognise, the academic development of university teachers must be embedded in an institutional framework that promotes quality teaching. They emphasise that "an institutional developmental framework with opportunities for formal and informal training is a suggested approach which will likely engage academic staff in actively pursuing their own personal learning" (p. 122). In fact, universities should focus on providing teachers with additional time for teamwork, promoting awards and financial support (Kenny et al., 2016), offering sufficient resources for their development (Chalmers, 2011), and valuing both innovative teaching and research achievements (Gast et al., 2017). However, institutions do not always facilitate the changes required by innovation, such as greater flexibility, the creation of teaching teams, or the integration of proposals from different subjects. (Cano, 2015).

Educational innovation projects are a learning space for teachers that influences their academic development (Paricio et al., 2019); they represent a way of understanding ongoing teacher training through the promotion of dialogue, the exchange of experiences, and reflection on practice. There is a common concern for improving teaching activity through research on one's own practice (Ereñaga De Jesús & Rekalde-Rodríguez, 2021), continuous debate with peers and

experts, and ongoing engagement with external stakeholders and the wider community (Imbernón, 2024).

In short, innovation is a strategic value for institutions (Couto Cantero, 2018), and innovation projects are a way for university teaching staff to develop academically (Feixas & Martínez-Usarralde, 2022). However, empirical studies on teacher development within sustainability-oriented educational contexts suggest a complex, fragmented, and still emerging body of evidence. Research indicates that teacher ESD remains a niche and underdeveloped field, with limited empirical evidence regarding its impact on teachers' academic development and a predominance of studies focusing on competencies or learning environments rather than on developmental outcomes (Fischer et al., 2022). Existing empirical contributions show that professional growth in these contexts is highly dependent on institutional conditions, collaborative structures, and policy frameworks, leading to significant variability across settings and limiting generalisability (Mulà & Tilbury, 2025). Studies point to positive effects, such as changes in teaching practices and the development of critical and reflective skills, which depend on sustained and well-supported initiatives such as professional learning communities (Meesuk et al., 2021). Furthermore, teacher development in ESD is characterised as a multidimensional and systemic process, requiring the integration of ethical, interdisciplinary, and transformative competencies rather than isolated training interventions (Brundiers et al., 2021; Cebrián et al., 2020; Lenziardi et al., 2025). Finally, empirical evidence highlights that teachers' prior beliefs and conceptualisations of sustainability significantly mediate their professional development, often constraining the depth and effectiveness of innovation processes (Ferguson et al., 2021).

In line with this landscape, this study aims to generate contextualised empirical evidence that provides a better understanding of teachers' academic development. In this regard, the study analyses how participation in Ocean i^3 contributes to teachers' development, taking into account both the perceived benefits and the factors that facilitate or hinder it. Conducted in a real-world context, this research provides valuable insights that help to advance the understanding of teacher academic development within sustainability-oriented teaching environments.

Methodology

Research Method

In accordance with the framework provided by the literature and the research objective, an interpretive approach (Denzin & Lincoln, 2011) was chosen. This approach aimed to understand Ocean i^3 teachers' perception regarding the impact of their participation on their academic development. In this case, the qualitative approach guided the study towards understanding this unique and particular situation (Cotán Fernández, 2016), seeking the meaning and sense that teachers gave to their actions and how they lived, perceived, and experienced the impact of this participation on their academic development.

A case study was chosen as one of the most characteristic strategies in the qualitative approach, suitable for analysing a situation in depth (Stake, 1995), and for studying the context thoroughly (Fiss, 2009). The case study provides detailed information closely connected to the context, offering an overview of the case while exposing different perspectives on that reality (Thomas, 2011).

Participants in the Research

The teaching staff who took part in this study were those with extensive experience in Ocean i^3 (more than three editions) and who coordinated innovation projects linked to sustainability. The selection was based on the fact that the informants possessed the key information for the in-depth analysis of the case; in other words, the selection followed an information criterion. They were contacted by email, and those who voluntarily agreed to participate contacted the researcher.

The result was 14 in-depth interviews (I) with teachers of different profiles: 10 women and 4 men, aged between 36 and 63, with a length of service at the EHU ranging from 6 to 35 years. Of these, 9 teachers were from the field of Social and Legal Sciences (Pedagogy, Infant and Primary Education, Criminology, Advertising and Public Relations, Business Administration and Management), 3 from the Humanities (French Philology, and Fine Arts), and 2 from Health Sciences (Nursing). All of them were involved in EHU's i^3 educational model, a dynamic, plural, and cooperative teaching-learning model in which students are central to curriculum development (Idoiaga Mondragon et al., 2024).

Instruments

The in-depth interview is a structured conversation guided by the researcher's purpose and is used in cases where the sample is small in order to maximise the usefulness of the information (Flyvbjerg, 2011). During the interviews, participants were asked to observe, pause, and reflect on what they had experienced in Ocean i3 in order to understand how they interpreted the impact their participation had had on academic development and what that impact had been (Flick, 2018). The researcher conducted the interviews with a brief script with open-ended questions that were adapted in order and wording during the conversation. These open-ended questions were related to the topics that the literature identifies as key to the academic development of teaching staff. For example, why did you join Ocean i^3? What would you highlight as the key features of the Ocean i^3 project? How has the collaborative work within the teaching team affected

you? Do you think that what you learned at Ocean i³ has helped you apply it to other areas of your academic work? What has your experience been like participating in Ocean i³ alongside your students? … The interviews lasted approximately one hour.

In addition, a focus group (FG) was formed with 6 teachers and coordinators of educational innovation projects linked to sustainability who were identified by the Director of the service responsible for these projects. The group consisted of 4 women and 2 men aged between 36 and 55, with between 6 and 21 years of professional experience; 4 were from the field of Social and Legal Sciences and 2 from Engineering.

According to Barbour (2020), the FG provides insights into the process, rather than the outcome, with group interaction and discussion as central features. In turn, Krueger and Casey (2014) suggest this instrument is useful for constructing meaning around the data. Following McMillan and Schumacher (2005), participants were selected based on their role as leaders in the field of educational innovation at the EHU. In this way, the information derived from the interviews could be triangulated. Some of the open-ended questions they answered were as follows: Do you think that teachers' involvement in educational innovation projects influences their professional development? Why and how? What do teachers learn from participating in educational innovation projects? … The FG lasted about an hour and a half.

Data Analysis

The analytical process followed consisted of a content analysis, which provides a systematic approach to uncovering meaning in textual data, both on the surface and implicit beneath it (Kleinheksel et al., 2020). This content analysis involved identifying units of meaning within the collected data and assigning them to categories determined according to their content. The categories were related to the opinions and assessments expressed by teaching staff regarding the impact of Ocean i³ on their academic development. In fact, this study began with categories derived from the theoretical framework and combined these with those that emerged from the data generated during the fieldwork (McMillan & Schumacher, 2005). Data saturation was reached when no new relevant categories emerged, and the data within each category became redundant, no longer contributing additional analytical value to the study. The resulting categorical system is presented in Table 2 in the Results section.

The qualitative analysis program NVivo 14 was used to process the information and manage the data.

Research Quality and Ethical Issues

The study ensured scientific rigour through veracity, following criteria for excellence in qualitative research (Tracy, 2010). This was achieved by establishing credibility through data triangulation, transferability through detailed contextual description, dependability through consistent results across the two instruments, and confirmability through faithful use of participant transcripts (Gurdián-Fernández, 2007). Specifically, the reliability of analysing the data was ensured through a combination of strategies that enhanced the consistency and transparency of the analytical process. In this case, data triangulation was carried out to improve quality and credibility, and researcher triangulation was undertaken via an advisory group, with the aim of reducing individual biases and enhancing the credibility of the analysis.

This advisory group was set up with different researchers. The group met on three occasions to discuss the research approach, the instruments to be used, and to contrast the results. Its formation (Table 1) was inspired by the figure of the advisory council promoted by the Communicative Methodology as a structure to gather the perspectives of people peripherally involved in the subject (Alonso Sáez, 2015).

Table 1. Profile of Participants in the Advisory Group

Gender	Age	Connection With Research Theme
Female	56	Expert in project design and management, with extensive experience in the design, development, evaluation and participation in innovation projects. Co-director of the Ocean i³ project.
Male	26	Lecturer at the EHU and expert in the field of university teacher training.
Female	24	Expert in Education for Sustainable Development and participant in Ocean i³ as a master's and doctoral student in several of the calls.

The researcher was an integral part of the research process, as they offered a particular interpretation of reality whilst also being responsible for its construction (Gurdián-Fernández, 2007). This dual role, as both researcher and participant, may have had implications of which the researcher was aware and which required explanation in the interests of transparency and bias management.

As regards data collection, all teaching staff were given the opportunity to participate, thereby avoiding sample bias; however, it cannot be ruled out that the researcher's dual role may have influenced the participants' testimonies. In terms of interpretation, there is a risk of subjective bias, because it is difficult to maintain a critical distance between 'what is experienced' and 'what is analysed'. However, the decision was made to prioritise interpretative richness (a deep understanding of the context, the decoding of cultural codes, interests, and intentions, etc.). Finally, reliability was

strengthened through the triangulation of data and researchers, as well as the transparent recording of methodological decisions.

Finally, ethical standards were also carefully observed in managing participants' anonymity and data security (Blaxter et al., 2010).

Results

The dimensions that teachers perceived as influencing their academic development through participation in Ocean i³ were related to the design of the innovative project, the institutional context, the teaching team, teachers' self-perception, and student participation in Ocean i³. The results are presented using the categorical system shown in Table 2.

Table 2. Categorical System

Dimension	Category	Sub-Category
Project design	Strategic approach	Alignment
		University regulations
	Characteristics	Wealth
		Diversity
		Complexity
Institutional context of innovation	Institutional recognition	On a positive note
		In terms of improvement
	Supports and obstacles	Endorsement by Vice-Deans
		Indifference
		Poor visibility
		Disinformation
	Funding	*Versus* involvement
		Insufficient
		Dissemination
	Pedagogical support	Internal
		Versus administrative
Teaching team	Collaborative work	Intra-groups
		Inter-groups
		Training strategy
	Reflection	Meaning
		Reflection-action
Myself as a teacher	Participation and involvement	Desire to be more involved
		Community support
		Student impact
	Training needs	Pedagogical knowledge
		Responses through context
		Skill development
	Transfer of learning	Teaching
		Innovation
		Research
The perception of student participation	Resistance to participation	Investment-return
		Sustainability theme
	Satisfaction with learning	Challenge theme
		Interdisciplinary groups
		Derived skills
	Unique relationship	Close and personal
		Roles are repositioned

Teachers' Perceptions of the Project Design

When discussing innovation design, the teaching staff stresses the strategic approach presented by the project with respect to university policy and the characteristics of the design itself. The teaching staff considers that the project is closely aligned with the university's international and strategic approaches. Specifically, the insertion of active learning methodologies in the Higher Education framework, the promotion of cooperation and teamwork, and the inter-transdisciplinary nature of educational approaches. The teaching staff stresses that being aligned or keeping pace is key to materializing what the EHU's i³ educational model is, with its virtues and its many difficulties. The staff feel that they are doing well, that they are complying with what the university says must and should be done:

> "When we go out, the fact that we have an i³ model is ideal for other universities. Outside, I think we are envied, and that means this is well underway" (FG_1).

An idea shared by the interviewees and the focus group participants.

Characteristics highlighted are the richness, diversity, and complexity of the project. *Wealth* is understood in a global sense, as a broad and welcoming project; as an open, flexible, and changing space. A working environment with colleagues from other departments and areas of knowledge that provides the opportunity for one to open their mind to other approaches to the same topic and different ways of tackling a problem. In terms of *Diversity*, they refer to the fact that the themes are very different in each edition and the participants vary (their backgrounds, the different roles they play, etc.). Diversity is understood from the point of view of the region, its international-cross-border-university character, the co-use of languages, and the coexistence of students from different levels (bachelor's, master's, and doctoral). In terms of the *Complexity* presented by the project, the transdisciplinary approach is underlined. It offers a different and alternative scenario to students in which collaborative learning plays a very important role:

> "From the point of view of learning, it is interesting how students and teachers can accompany each other within a project that pursues a mission, a common goal that allows you to establish a connection with other disciplines. At first, it seems to have nothing to do with you, but then you see that it is not true; it is wonderful how we can complement each other" (I_9).

The design of Ocean i³ is perceived as coherent not only because it follows institutional strategic guidelines, but also because it provides a particularly rich learning environment for professional development. The combination of institutional alignment, openness, diversity, and a transdisciplinary approach creates a setting that fosters collaboration, the exchange of perspectives, and the shared construction of knowledge. However, this complexity creates organisational and pedagogical challenges that require a high degree of commitment from teaching staff. Thus, the value of the project lies in this tension between opportunity and difficulty, which makes it a significant space for innovation and academic learning.

Teachers' Perceptions about the Institutional Context of Ocean i³

The teaching staff discusses the university's Recognition of their participation, work, and effort invested in the innovation project. Teachers say that recognition is insufficient despite the fact that involvement and performance in innovation projects involves improving and training for their teaching practice and not material things (certificates, credits, money, etc.). They allude to the need to bring recognition in this field on a par with that obtained in research. Hence, they comment that novice teachers are reluctant to participate:

> "For me, the biggest recognition, without a doubt, is the feedback that you receive on a personal level. There really is no recognition from the institution. All the hours you put in, you invest them just because. They are not taken into account in your timetable, in the credits..." (I_1).

With regard to the *Support* and *Obstacles* that the participants identify in relation to their participation, the perception of the teaching staff is balanced. They feel that they perceive greater support from the higher levels of the institution (rector's office, vice-rectors, central services), compared to those closer to them (departments, degrees, faculties):

> "They didn't give me a hard time, but I didn't get any support either. I had to organise myself, organise my diary... I had to figure it out for myself" (I_4).

As Table 2 shows, teachers highlight the indifference, disinformation, and low visibility of their work amongst colleagues who are not involved in the project. This same perception is evident in the focus group, where it is noted that the innovation concerns only the teachers involved.

The *Funding* is another issue they refer to, discussing the budget allocated for the development of the project. In this sense, they speak of a motivation for wanting to participate and get involved in innovation projects as opposed to the associated funding. They also mention the scarce funding for innovation projects as opposed to research projects, as well as the impact that this scarce funding has on the dissemination of results. In this sense, they are involved in innovation for internal rather than external reasons, stressing that these projects go ahead, not so much because of the funding they obtain, but because of the commitment, effort, and work of the people behind them:

> "It is true that with more funding it is possible to fine-tune the project, but I don't think this is the main variable for a good outcome. For me, the involvement and the desire that we as teachers put into the work is more important" (I_3).

Finally, regarding *Pedagogical support*, the voices refer to the internal support that the project has had throughout its development and that has come from the people who were participating in it. The fact that they did not perceive the need for additional external pedagogical support is underlined:

> "In Ocean i³ we are a team of teachers with a lot of knowledge and skills, and we have supported each other and helped each other to solve problems, and we have always solved... this pedagogical need, need for support, without having to ask for help from the outside" (I_4).

However, the teachers who mention the pedagogical support received from outside describe it as primarily

administrative and project management support. This is the same view that emerged from the focus group.

The findings show that the institutional context in which Ocean i[3] operates involves a combination of individual commitment and limited structural recognition. Although teachers view support from higher institutional levels positively and highlight the strength of internal collaborative work as their main source of pedagogical support, significant shortcomings persist in terms of formal recognition and visibility. This situation creates tension between the teachers' intrinsic motivation and the organisational conditions within which their participation takes place, which may affect both the sustainability of the initiatives and the involvement of new teachers. Thus, academic development in this context appears to be strongly conditioned by institutional factors which, beyond the project's design, have a decisive influence on its scope and impact.

Teachers' Perceptions of the Teaching Team

The contributions highlight the collaborative work developed within the teams (intra) and externally (inter), the existing leadership, the formation of working groups as a training strategy, and, finally, the reflection generated within the teams as a unifying element of the work (see Table 2).

Teachers underline that *Intra-group collaborative work* promotes involvement and commitment to the task, facilitates efficient management, and strengthens relationships:

> "Working in small groups has been a very good idea because we have been able to get more involved in the project. We have adapted quite well to each other's capabilities and have been building a final product that has been very interesting" (I_2).

Regarding *Intergroup collaborative work*, participants underline that they generate a sense of connection with the tasks carried out by the different groups through the exchange of knowledge and experience. It serves to understand the state of the different themes, to contribute ideas, to engage with the content, and to reinforce the idea that inter-group collaborative work tends towards the co-creation of new ideas, materials, and proposals:

> " If there had not been this exchange, it would have been difficult to talk about collaborative work from the level of a larger group" (I_10).

Teamwork is also highlighted as a *Training Strategy*, as it provides in which teachers promote self-directed training processes and generate collaborative structures with colleagues with whom they do not usually work at the university. According to the participants, this is often lacking in academic work:

> "We normally work alone, and if we do it in a group, it is usually because we share the same discipline. This type of project offers you broader training, not only in content but also in terms of how things are done. In this training, you learn how to do academia" (I_14).

Regarding the shared *Reflection* promoted within the work teams, teachers state that this process enabled them to give greater meaning to what they do, to look beyond the same problem from different perspectives, to adopt others' good practices as their own, and to become aware of the importance of combining reflection with action.

As for reflection as a task itself, it gives teachers greater meaning in their academic activity, allowing them to connect their different activities and gain a broader understanding of the whole:

> "This group has given me a space to reflect. Above all, that is the main value for me, to reflect on what I was doing. Rethink the things I do, how I do them, and whether the why makes sense to me and to my students" (I_2).

A reflection accompanied by action, where reflection assumes the practical sense of seeking to improve educational action, in this case, the project itself:

> " For me, reflection is essential but accompanied by action, because that is how it has value" (I_11).

The findings highlight that the teaching team acts as a key space for professional development, where collaboration—both within and between groups—goes beyond simple coordination to become a mechanism for the co-construction of knowledge and shared learning. The organisation of group work, together with dynamics of exchange and joint reflection, fosters not only engagement and a sense of belonging but also processes of self-development and openness to new ways of engaging in academia. In this context, reflection linked to action emerges as a unifying element that gives meaning to teaching practice, enables the continuous improvement of the project, and consolidates the team as a learning environment.

Teachers' Self-Perception

Here, the contributions are related to the participation and involvement of the teaching staff in the project, the training needs generated through their participation, and finally, the transfer of what they have learned to other areas of their academic practice (see Table 2).

The teachers' testimonies reveal that the support of the teaching community and the impact the project has on their students are strong incentives for their participation and commitment. However, they also express a certain sense of guilt for not being more involved. They claim that other academic tasks and positions of responsibility prevent greater commitment:

> "I realised that at the time, being vice-dean made it very difficult for me to participate as I would like to. I find the project very, very interesting, but circumstances don't always allow you to dedicate as much time to it as you would like" (I_6).

Innovation is not always a priority for teachers, a point that was also raised in the focus group.

With regard to the training needs that participation in the project may have generated, the teachers highlight the previous lack of pedagogical training. They underline that the decision to pursue training within the university is left to individual teachers, and that workload and lack of time do not work in their favour.

However, teachers point out how the project has offered them the possibility to address some of the pedagogical gaps identified through collaborative work:

> "The project itself has been identifying gaps and filling them. For example, student monitoring in Ocean i³. Student monitoring was not so standardised before, and now I see it" (I_2).

In addition, they point out that the project has generated interest in exploring certain topics and issues in greater depth. This interest has led teachers to seek ways to fill these gaps:

> "It has made me think that I have to read more about this, or I'll write this down, I have to check this later if it's true, in that sense, yes ... In the sense of wanting to learn more. It has created or awoken a curiosity in me, of course it has" (I_12).

At the same time, teachers highlight the development and implementation of certain skills in the context of Ocean i³, particularly in relation to new technologies, the design of participatory dynamics, and interpersonal skills such as empathy:

> "Putting ourselves in other people's point of view, at the teacher level. As teachers, we have to be empathetic, and we have to make the effort to put ourselves in other teachers' shoes and understand them. It helps to be in Ocean i³ because the empathy it generates is what moves it forward" (I_4).

As for the *Transfer* of what they have learned in the project, teachers highlight its application to the teaching methods used in other courses, to other innovation projects, and to research into their field of knowledge, drawing on the experience gained in Ocean i³.

In relation to *Teaching*, some teachers refer to the changes that the innovation project has brought about in their other subjects, particularly those associated with the methodological approach promoted by Ocean i³:

> "In a subject that fits very well, I have contacted an external agent to propose a challenge around environmental sustainability through a challenge-based methodology. It is related to the Ocean experience, but not to its complexity" (I_2).

Likewise, the teaching staff highlights how the learning acquired has been transferred to the management of student groups, classroom activities, and combined virtual and face-to-face activities:

> "Everything we do in Ocean inspires me. I recycle everything, tasks, activities... I reuse them and adapt them to my classes" (I_5).

As for the transfer to the field of *Innovation*, they comment that keeping in mind the *Ocean i³* way of working:

> "I have learned that, and I am transferring it, let's say that style of relationship, the way the project is run, ... I have an ideology, a way of doing things that I would like to maintain or carry out if I have to propose another project. The truth is that on a personal level, it has an impact on everything" (I_8).

Finally, the transfer to the field of *Research* is associated with the contact and connections with the social fabric. This link created at the teaching level is also transferred to the research level through the network of contacts created:

> "The search that everyone has to go through has been very interesting for me; you explore the possibility of working with agents and of expanding the community. This information is also useful to me for other academic matters, as improving the research network" (I_1).

These findings show that teachers' self-perception is shaped by a balance between motivation, structural limitations, and emerging learning processes. Participation in the project acts as a catalyst for professional development, highlighting gaps in training—particularly in teaching methods—while offering opportunities to address them through practice and collaboration. This process not only fosters a reflective attitude and a continuous willingness to learn, but also leads to the acquisition of skills and the transformation of teaching practices outside the project itself. Thus, the impact of Ocean

i³ extends beyond the immediate sphere of innovation, reaching teaching, research, and future projects, and contributing to a broader redefinition of the academic role of teaching staff.

Teachers' Perception of Student Participation

The contributions discuss students' resistance to participating and committing to Ocean i³, the satisfaction teachers perceived in students following their participation in the project, and, finally, the unique relationship established with the students who participated in Ocean i³.

The *Resistance* shown by students participating in Ocean i³ through voluntary internships or coursework reflects common challenges that teachers may encounter when introducing innovation in the classroom. Interviewees mention initial resistance derived from practical issues such as timetable coordination, group formation, attendance, etc. On the other hand, these resistances are more pronounced when they relate to the development of final year projects or master's theses within this environment. In this case, the teaching staff refers to the additional investment of time, effort, and work required compared with a more traditional approach. Teachers feel that the extra effort required by such a project hinders student participation and commitment. They mention that students tend to carefully weigh the time and effort required in academic tasks, which makes it difficult for them to engage in environments such as Ocean i³:

> " The main resistance comes from, what am I going to get out of it? The question of: If I get involved in a project like this, what do I get out of it? What's in it for my dissertation in this environment compared to doing it like the rest of my classmates?" (I_7).

Regarding resistance to sustainability-related issues, teachers perceive a lack of a culture that prioritises collective, social, and territorial interests over individual ones. Hence, students' reluctance to choose this project for the development of their final year project or master's thesis, as they do not perceive a direct connection between the topic and their studies or future careers:

> "To motivate on the subject was the most difficult part. We tried to sell it in some way" (I_13).

With regard to the *satisfaction* derived from students' participation in the project, the teaching staff reports that students are highly satisfied, except in a few cases. They underline that engaging with a real and visible social problem is a source of authentic learning for them:

> "They are very satisfied with what they have learned in the experience. It puts them in front of a very real situation, and what they always say is that they have the impression of having learned to plan a real sequence from beginning to end, using tested activities..." (I_1).

Likewise, the way in which challenges are addressed in interdisciplinary groups, together with colleagues from other universities and guided by professors from different disciplines, is considered a source of learning:

> "(…) they do not work from their perspective, but from what I can do and collaborate to respond to a challenge. And the more tangible the end result, the higher the level of satisfaction" (I_6).

In addition, teachers emphasise the learning derived from the skills associated with presenting and orally defending their results:

> "When they have to present what they have done to the community(…), it is a vital experience for them and a learning experience for the future. You can feel that they are nervous and excited at the same time. They come out of there as if to say here I am" (I_12).

With regard to the *unique relationship* created between students and teachers within the project environment, teachers refer to the more horizontal, close, and personal relationships that emerge. They emphasise the support required within this environment, which goes beyond the purely academic dimension. This generates a sense of closeness between both parties by breaking down the distance traditionally created in the classroom. New, more personal communication forms are explored, repositioning the teacher not as an *authority figure* but as a *partner* in facing a shared challenge:

> "The students saw that you were there in the workshops with them, you participated in the workshops like them, and you shared the day, the meals, the work... with them. Such sharing brings us closer together. It creates a sense of community" (I_11).

These results show that student participation in Ocean i³ evolves from initial resistance into a highly meaningful learning experience. While factors such as the extra effort required, the strategic nature of the project, or the perceived limited connection to students' immediate interests may hinder engagement, the project experience generates high levels of satisfaction once these barriers are overcome. Exposure to real-world situations, interdisciplinary collaborative work, and the development of practical skills contribute to deep and applied learning. Furthermore, the environment fosters closer and more horizontal relationships between teachers and students, reinforcing a sense of community and redefining traditional roles.

Discussion

The findings regarding project design reinforce the view, widely supported in the literature, that the academic development of teaching staff cannot be understood in isolation from the institutional context in which it takes place (Feixas & Euler, 2012; Hénard & Roseveare, 2012). In this regard, the perceived alignment between Ocean i[3] and the university's strategic guidelines acts as a key facilitating factor, lending legitimacy, coherence, and meaning to teachers' participation. As Loads et al. (2019) point out, organisational support and recognition of strategic change initiatives are fundamental conditions for promoting staff involvement in innovation processes, which in this case translates into a strong identification with the institutional educational model.

The project's characteristics of openness, diversity, and transdisciplinarity are in line with contemporary approaches that view academic development as a complex, situated, and multidimensional process (Brundiers et al., 2021; Sorcinelli et al., 2005). Interaction between teachers from different disciplines fosters dynamics of exchange, reflection, and the co-construction of knowledge, key elements in professional learning (Ereñaga De Jesús & Rekalde-Rodríguez, 2021; Paricio et al., 2019). Furthermore, the emphasis on active methodologies and collaborative learning aligns with current demands for the transformation of higher education, particularly in the field of ESD, which requires interdisciplinary and action-oriented approaches (Cebrián et al., 2020; Lenziardi et al., 2025).

However, the complexity of this type of design also highlights significant tensions. Institutional alignment, while necessary, does not guarantee processes of profound transformation unless it is accompanied by intrinsic motivation from the teaching staff (Breslow et al., 2004). Furthermore, the richness and diversity of the environment entail organisational and pedagogical demands that require time and coordination, aspects that are not always sufficiently supported by university structures (Cano, 2015). In this regard, the results show that the educational value of the project lies in the tension between opportunity and difficulty, confirming that academic development in contexts of innovation—particularly in ESD—is a non-linear process conditioned by multiple factors (Fischer et al., 2022; Mulà & Tilbury, 2025).

As for the institutional context, the findings confirm that academic development is heavily influenced by organisational factors (Day, 2005; Hénard & Roseveare, 2012). The perception of insufficient recognition highlights a persistent structural tension: the lower value placed on teaching innovation compared to research. As Kenny et al. (2016) and Gast et al. (2017) indicate, the lack of formal incentives may limit staff engagement and discourage participation, particularly among early-career lecturers.

Furthermore, the discrepancy between the support perceived at higher institutional levels and the lack of involvement at the local level highlights the importance of the micro-context (Ryan et al., 2004). Although policies favourable to innovation exist, their implementation depends on the day-to-day conditions faced by teaching staff. The lack of visibility, local support, and knowledge-sharing amongst colleagues reinforces the idea that professional development is a situated process that requires organisational coherence (Feixas & Euler, 2012).

Despite these limitations, teachers' participation is largely driven by intrinsic motivations linked to a commitment to improving teaching. This finding is consistent with that of Breslow et al. (2004), who note that genuine transformation requires personal commitment, although they also highlight the limitations of such motivation when it is not supported by appropriate institutional conditions.

The role of collaborative internal pedagogical support ties in with the importance of communities of practice in professional development (Meesuk et al., 2021; Paricio et al., 2019). However, the lack of more structured institutional support limits the consolidation of these initiatives. Taken together, these findings demonstrate that the sustainability of innovation processes depends on an institutional ecosystem that recognises and coordinates them in a coherent manner.

The findings regarding the teaching team reinforce the idea that academic development is a social process mediated by interaction (Paricio et al., 2019; Sorcinelli et al., 2005). In contrast to disciplinary isolation, collaborative dynamics demonstrate the potential of collective spaces to foster meaningful learning. The exchange of experiences and the co-construction of knowledge foster critical reflection on practice (Ereñaga De Jesús & Rekalde-Rodríguez, 2021).

Teamwork as a training strategy demonstrates that academic development also occurs in informal, practice-based contexts (Feixas & Euler, 2012). Interdisciplinary interaction responds to the demands of ESD, which requires collaborative and complex approaches (Brundiers et al., 2021; Cebrián et al., 2020). In this sense, the teaching team functions as a community of practice that facilitates both learning and the transformation of professional identity.

Moreover, reflection linked to action emerges as a central element, in line with the principles of academic development (Imbernón, 2024). This is not abstract reflection, but rather reflection geared towards improvement, which ties in with the idea of individual and organisational transformation (Taylor & Colet, 2010). The teaching team is configured as a formative environment that brings together learning, identity, and continuous improvement.

With regard to their self-perception as teachers, the results show that professional development is shaped by the interplay between personal motivations, structural constraints, and learning opportunities (Day, 2005; Sorcinelli et al., 2005). Involvement in the project, underpinned by its impact on students, confirms the importance of intrinsic factors (Breslow et al., 2004), although difficulties in balancing responsibilities highlight organisational constraints (Kenny et

al., 2016).

The identification of gaps in pedagogical training reinforces the view that university lecturers are inadequately prepared for teaching (Feixas & Euler, 2012). In this regard, the project serves as a context-based learning environment that enables these gaps to be addressed through practical experience (Paricio et al., 2019; van den Beemt et al., 2023). Furthermore, it stimulates curiosity and a continuous willingness to learn, key elements for academic development.

The development of competencies—methodological, technological, and interpersonal—is consistent with ESD approaches, which incorporate ethical, collaborative, and transformative dimensions (Brundiers et al., 2021; Cebrián et al., 2020). This learning is transferred to other areas, confirming the potential of innovation as a driver of change in teaching practice.

The transfer to teaching, innovation, and research reflects an integrated view of the academic role, consistent with the idea of individual and organisational transformation (Taylor & Colet, 2010). Thus, initiatives such as Ocean i^3 help to redefine the role of teaching staff, fostering more reflective profiles committed to continuous improvement.

Finally, the findings regarding student engagement demonstrate how teachers' academic development is influenced by teaching and learning dynamics. Initial resistance reflects the tensions students experience when faced with innovation in traditional settings (Cano, 2015), as well as the influence of the context on students' decisions (Ryan et al., 2004).

However, once these barriers have been overcome, high levels of satisfaction associated with authentic learning emerge, in line with the literature on ESD (Cebrián et al., 2020). Interdisciplinary work and problem-solving foster deep learning and the development of sustainability skills (Brundiers et al., 2021), while also requiring new forms of teacher support.

The transformation of teacher-student relationships towards more horizontal models reinforces the redefinition of traditional roles (Imbernón, 2024). The emphasis on support and community-building helps to create more participatory and meaningful environments. In this sense, Ocean i^3 not only impacts student learning but also acts as a space for transforming teaching practice, where more collaborative, reflective, and action-oriented approaches to teaching are developed.

Conclusions

The findings of this study enable us to understand teachers' academic development as a deeply situated, relational process shaped by the interplay between individual, collective, and institutional factors. In this regard, the results complement and expand upon existing perspectives by demonstrating that teaching innovation—particularly in the field of ESD—cannot be explained solely by individual motivation or institutional policies, but rather by the dynamic tension between the two.

The main contribution of this study lies in providing empirical evidence of how complex, open, and transdisciplinary projects function simultaneously as learning spaces, practice environments, and catalysts for professional transformation. Unlike previous studies, which tend to analyse academic development either from the perspective of institutional structures or communities of practice, this study shows how both levels are intertwined, generating a learning ecosystem in which innovation emerges precisely from that interaction, despite its inherent contradictions.

Furthermore, it offers a fresh perspective by identifying the tension between opportunity and challenge as a constitutive—rather than merely limiting—element of academic development within sustainability-oriented teaching environments. This tension not only shapes participation but also defines the educational value of the experience by stimulating deeper processes of reflection, adaptation, and transformation.

In addition, the study broadens our understanding of the role of students, demonstrating how their participation is not merely a consequence of innovation but an active factor that feeds back into teaching development and helps to redefine pedagogical relationships.

All in all, the academic development can be conceptualised as an ecological, non-linear, and multidimensional process, in which the sustainability of innovation depends on the coherence between institutional structures, collaborative dynamics, and shared learning experiences.

Recommendations

These recommendations provide specific guidance on how to strengthen academic development processes within sustainability-oriented environments. They translate the study's findings into concrete actions designed to reinforce sustainable, collaborative, and educational innovation ecosystems.

For researchers:

- To conduct in-depth studies analysing academic development from an ecological perspective, exploring how individual, collective, and institutional factors interact in different educational contexts.

- To design research incorporating longitudinal and participatory methodologies to capture how the tensions between opportunities and challenges evolve throughout innovation processes.

- To examine in detail the role of students as active agents in educational transformation by systematically incorporating their voices into the analysis.

- To develop theoretical frameworks that integrate the concept of a learning ecosystem and enable an understanding of teaching innovation in sustainability contexts as a non-linear, relational, and situated phenomenon.

- To conduct comparative studies of transdisciplinary projects carried out in ESD contexts in order to identify common patterns and conditions that promote teachers' academic development.

For practitioners and institutional leaders:

- To create flexible structures that recognise and support the interaction between individual motivations and institutional policies, fostering spaces where these two dimensions can interact constructively.

- To promote complex, open, and transdisciplinary teaching projects that serve simultaneously as contexts for training, practice, and professional transformation.

- To integrate the management of tensions—between opportunity and challenge—as a strategic component of teacher support, recognising conflict as a driver of learning.

- To foster stable collaborative processes that link communities of practice with institutional structures, strengthening the coherence of the innovation ecosystem.

- To ensure that sustainability initiatives are aligned with the actual conditions of the context (timing, resources and recognition), avoiding innovations that rely solely on individual effort.

- To establish mechanisms for systematic reflection (practice logbooks, mentoring, seminars, etc.) that help teaching staff interpret and make the most of the inherent complexity of innovation processes.

Limitations

The complete freedom with which teaching staff participated in the research may have been influenced by the relationship and friendship developed over the years with the researcher, who was also a participating teacher within the research context. This relationship may have led to more favourable responses, in line with perceived expectations. Furthermore, certain positive aspects of the process may have been highlighted, whilst tensions or conflicts were minimised. In addition, this study was limited to participating teachers from the University of the Basque Country and did not include those from the University of Bordeaux. This absence may have reduced the diversity of perspectives and limited the possibility of comparing institutional contexts. This has likely led to findings that focus more on the specific dynamics of the University of the Basque Country, without capturing potential similarities and differences that might emerge in a broader cross-border context. This limitation will be addressed in future research.

Ethics Statements

The research was favourably evaluated by the Ethics Committee for Human Research of the University of the Basque Country (reference M10_2023_377). In accordance with the European Data Protection Regulation (EU2016/679), the data were registered under code TI0625 at the University of the Basque Country. Informed consent was received from all participants.

Acknowledgements

I would like to thank all teachers who participated in this study for their generous collaboration. Thanks to their contribution, we can continue advancing our understanding of how to improve teachers' academic development in sustainability-oriented environments.

Conflict of Interest

The author declares no competing interests.

Funding

No funding was received for conducting this study.

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