

Towards an Interdisciplinary Terminography for Sustainability Education *

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Abstract

Sustainability is an inherently interdisciplinary domain in which the same terms frequently carry distinct meanings across the economic, environmental, and social pillars. This terminological variation presents significant challenges for both teachers and students in sustainability-related programs, who must navigate divergent disciplinary definitions without adequate representational tools. The present article examines the terminological implications of this challenge and argues that a new model of term entries is necessary to represent the integrative complexity of sustainability terminology. Using the term *resilience* as an illustrative case, we propose an interdisciplinary term entry model that displays pillar-specific definitions and corpus contexts, making the conceptual overlap visible to learners. We further argue that infographics represent an optimal format for such entries, given their capacity to package multidimensional knowledge in a compact, multimodal, and pedagogically accessible way.

Keywords

Interdisciplinarity, Sustainability, Knowledge integration, Sustainable pedagogy, Infographics

1. Introduction

The present article is a continuation of our previous research on the terminology of the interdisciplinary domain of Smart Urban Coastal Sustainability [1], conducted within the framework of the EU-CONEXUS European University Alliance. Launched in 2019, EU-CONEXUS brings together nine universities with the shared mission of advancing knowledge in smart urban coastal sustainability through the integration of expertise from disciplines as diverse as life sciences, environmental engineering, coastal management, and social and cultural sciences. The central goal of this network is to promote collaborative research across institutional and disciplinary boundaries and to develop joint curricular programs that prepare students to engage with sustainability challenges in urban coastal areas. It is precisely this pedagogical dimension that motivates the present study.

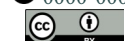
When students encounter sustainability-related terminology in course materials drawn from multiple disciplines, they are frequently confronted with the same term carrying different meanings depending on the disciplinary context in which it appears. Broad and semantically flexible terms such as *sustainability*, *equity*, *resilience*, *vulnerability*, *natural capital* or *circular economy*, may carry well-established meanings within individual disciplines of economics, ecology, and sociology but in the context of sustainability they function as integrative concepts that synthesize perspectives from several disciplines simultaneously. This dual nature presents a significant challenge both for students, who must navigate divergent definitions, and for teachers, who must translate and reconcile specialized knowledge across disciplinary boundaries.

The UNESCO Education for Sustainable Development framework for 2030 [2] underlines education's central role in achieving the 17 Sustainable Development Goals, with particular emphasis on the cognitive learning dimension, oriented towards the understanding of sustainability challenges and their complex connections, and encouraging the exploration of

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innovative ideas and alternative solutions. Meeting this cognitive demand requires learners to move beyond the logic of a single discipline and to engage productively with knowledge that is inherently cross-sectoral.

The challenge of teaching and representing interdisciplinary knowledge is therefore both a terminological and a pedagogical problem. From a terminological point of view, specialized knowledge has traditionally been organized in discipline-specific formats suited to understanding meaning within a single field. However, term bases have not yet been systematically explored as a resource for presenting interdisciplinary knowledge and integrated perspectives that would enable learners to understand the conceptual transfers and correlations between disciplines.

The present research argues that a new model of term bases should be envisaged that could respond to the needs of an interdisciplinary domain seeking to represent multifaceted concepts. The subject of sustainability was chosen to illustrate the complexity of the integration of knowledge. Taking the example of the term *resilience*, we aim to illustrate an interdisciplinary term entry that brings together the three sustainability pillars in a single representational format.

The rest of the paper is organised as follows. Section 2 outlines the main principles and challenges of interdisciplinary research for terminology management. Section 3 examines sustainable pedagogy as a case study of interdisciplinary communication, and presents the interdisciplinary term entry model (Section 3.1), and the use of infographics as a representational format (Section 3.2). Section 4 draws conclusions and outlines directions for future research.

2. Interdisciplinarity: challenge for terminology management

Interdisciplinarity is generally understood as a process of integrating knowledge from two or more disciplines in order to address complex problems that no single discipline can resolve on its own. This integration involves contrasting multiple disciplinary paradigms and combining the perspectives of multiple stakeholders [3]. According to Krohn [4], interdisciplinarity calls for an expansion of knowledge and a form of cognitive advancement that is not available to single-discipline inquiry. When disciplines interact, they do not merely aim to share information but also to enrich one another's conceptual frameworks and methods.

In higher education, interdisciplinarity offers students the opportunity to connect ideas between fields, to offer responses to complex questions, and to organize their learning in a more coherent and integrated way [5, 6]. The goal is not simply to create new knowledge to solve difficult problems, but also to help students learn how to combine and use knowledge from multiple disciplines independently and creatively. This includes recognizing the relationships between concepts and applying them to real life challenges. To do this successfully, knowledge must be presented in a way that makes connections between disciplines visible. This is where terminology plays an important role. Instead of presenting monodisciplinary, fragmented view, conceptual and terminological differences between disciplines can serve as productive points helping to connect multiple perspectives on complex phenomena. For this reason, terminologists describing the interdisciplinary domains are invited to move beyond single-discipline explanatory models and instead to analyse disciplinary borrowing and conceptual transfer, showing how a term's boundaries may expand, narrow, or shift as it is adopted across fields.

Scientific communication offers ample evidence that terms naturally migrate across disciplinary domains. Lele and Norgaard [7] describe these migrations as producing "mismatched taxonomies," in which disciplines categorise the same phenomena differently and with incompatible conceptual assumptions. According to Mauser et al. [8] the absence of a shared and unified vocabulary for defining multiple perspectives results in significant communication barriers and misunderstandings which limits the integration of knowledge.

Developing a shared language and mapping concepts across disciplinary boundaries are therefore the key prerequisites for mutual understanding, because they enable comparison, generalisation, prediction, and the resolution of disagreements [9, 10]. In this perspective,

disciplines can be understood as knowledge spaces with overlapping zones, where concepts that originate in one field are adopted and reinterpreted in others, thereby contributing jointly to the development of knowledge [11].

The methodological challenge of representing interdisciplinary sustainability terminology was already confronted in our previous research. Sustainability is a relatively recent and still developing domain, and it has not yet produced a dedicated community of specialists who work exclusively within it. Authors of scientific papers in this area are predominantly specialists from established disciplines, like environmental science, economics, engineering, or sociology, who incorporate sustainability into their existing research frameworks. As a result, terminological input comes from multiple disciplinary traditions simultaneously, each carrying its own definitional conventions and conceptual assumptions.

From a terminological point of view, this means that sustainability has not yet formed a stable conceptual system or a fixed, unified terminology of its own. This is precisely what makes it difficult to approach using traditional terminological principles, which assume term monosemy and a single, coherent concept system per domain. Treating sustainability as a fixed and unified discipline would give a false impression of its terminology. It would either force distinct meanings into one simplified definition, or privilege one discipline's perspective at the expense of the others.

Two theoretical constructs are particularly relevant for describing how concepts function in this kind of interdisciplinary circulation. Baggio et al. [12] distinguish between *boundary objects* and *bridging concepts*, each of which operates differently across disciplines. Boundary objects are overlapping concepts shared by different communities but interpreted differently within each. Their definitions vary between fields, may change over time, and tend towards increasing standardization as they circulate more widely. Bridging concepts, on the other hand, are supradisciplinary as their definitions are explicitly cross-sectoral and they function as coordination points between disciplines. They are distinguished by their capacity to support interdisciplinary and transdisciplinary exchange, to link scientific knowledge with policy-making, and to create deliberate integration between otherwise separate areas of research and practice. Unlike overlapping concepts, which can operate in the presence of multiple, distinct meanings, bridging concepts play a more intentional role in building shared understanding across disciplinary boundaries. These two constructs provide a useful analytical framework for examining sustainability terminology, where both types of cross-disciplinary function are frequently observable.

3. Sustainable pedagogy

The process of transformation towards sustainability draws simultaneously on knowledge from natural sciences, social sciences, technology, and economics, and is commonly structured around three interdependent pillars, environmental, economic, and social. The very complexity of this structure creates significant difficulties for sustainability communication, especially in making knowledge clear and accessible to broad audiences [13].

These difficulties are reflected in educational practice. Research on sustainability pedagogy has shown that interdisciplinary concepts require a degree of conceptual decoding before they can be usefully applied in educational contexts. Sprain and Timpson [14] argue that sustainability science demands a fundamental shift in educational approaches, since the complexity and systemic nature of sustainability challenges require students to move beyond single-discipline thinking and develop the capacity to work across biological, social, and economic frameworks simultaneously. The authors highlights that traditional teaching methods are insufficient for achieving this cognitive reorientation. Instead, there is a need for specialized educational tools designed to help students handle ambiguity, integrate knowledge from multiple disciplinary perspectives and apply the synthesized insights to solve real-world problems.

Carew and Mitchell [15] provide complementary evidence at the level of academic experts. When asked to define environmental, social, and economic sustainability, 23 Australian engineering academics collectively produced more than 120 qualitatively distinct ideas, suggesting that even specialists working in the same professional field hold substantially different understandings of the same concept. The authors argue that this variation among academics directly influences how sustainability is taught to students, demonstrating that terminological instability at the expert level is transmitted into educational practice. Importantly, rather than treating this variation as a problem requiring standardisation, they propose using it as a pedagogical resource by making multiple disciplinary perspectives explicit and encouraging students' critical reflection. Their argument is that no single disciplinary definition of sustainability is sufficient, and that terminological diversity is a fundamental characteristic of interdisciplinary knowledge.

Taken together, these findings point to a specific terminological need. Teaching concepts such as *resilience*, *vulnerability*, and *natural capital* in a sustainability context demands an integrative approach that can represent unified knowledge from different disciplines rather than reducing complexity to a single disciplinary lens. From a terminological perspective, this requires a specific kind of interdisciplinary term entry that can provide genuine synthesis by showing how disciplinary perspectives meet, overlap, and sometimes productively challenge one another within the broader sustainability framework.

3.1. The need for an interdisciplinary term entry

A conventional term entry presents knowledge from within a single disciplinary perspective and typically offers fragmented, isolated information that reflects the conceptual boundaries of one field. This limitation becomes problematic when the concept to be described is inherently interdisciplinary. Terms such as *resilience* and *vulnerability* carry distinct but related meanings in ecology, economics, and social science simultaneously, and their sustainability-relevant meaning emerges precisely from the overlap between these disciplinary framings. Similarly, bridge concepts such as *natural capital* and *circular economy* are not simply borrowed from one discipline to another but are developed through the interaction between environmental science and economic theory, and they cannot be fully defined from only one of these perspectives.

A terminologist working within the conventions of traditional terminology faces a structural challenge in this context. Many sustainability-related concepts are multi-referential and span several disciplinary "pillars", which conflicts with the principle of monosemy that underpins traditional term base construction.

Selecting single disciplinary definitions for each pillar risks misrepresenting and simplifying the concept. On the other hand, listing multiple definitions side by side may imply that they are merely parallel alternatives, without showing how they relate to one another. This can make the entry confusing or difficult to use, especially for students. In other words, the terminologist must balance conceptual precision with pedagogical clarity, while also representing integrated knowledge.

In Table 1 we illustrate a draft of an interdisciplinary term entry for the term *resilience* that brings together several disciplinary perspectives within a single visual space. The examples were taken from the subcorpus of the Europarl corpus, which was chosen because the European Parliament is one of the few institutions where environmental, social, and economic sustainability issues are discussed together in the same policy and legislative framework. Its documents address sustainability in a cross-sectoral way since EU policy explicitly requiring these three dimensions to be considered jointly.

For the purposes of this study, a subcorpus was compiled from the europarl.europa.eu domain using the web-crawling function in Sketch Engine and the three independent sets of seed words, each representing one of the three sustainability pillars. The economic pillar was defined by the seeds *economic growth*, *economic health*, *substitutability*, *natural capital*, *natural stock*, *capital stock*,

consumption, and circular economy; the social pillar by equity, subsistence, accountability, engagement, auditing, participatory budgeting, adaptation, and mutualism; and the environmental pillar by cleaner production, eco-design, eco-efficiency, green chemistry, recycling, renewable resources, and pollution prevention. This design ensured that the resulting corpus contained terminologically rich material from all three pillars while remaining consistent in institutional register and source type. The final corpus is monolingual in English and contains 17,089,713 tokens and 13,823,294 words.

Table 1

An interdisciplinary term entry for the term *resilience*¹

Sustainability pillar	Definition	Corpus context
Economic	The capacity of an economic system, financial institution, or market to withstand external shocks, maintain core functions under stress, and recover operational stability without structural collapse.	<i>Prudential regulation should aim at enhancing the resilience and soundness of the financial system.</i>
Environmental	The capacity of an ecosystem, natural environment, or climate system to absorb disturbance, reorganise under change, and preserve its essential structure, functions, and processes over time.	<i>Protecting biodiversity and strengthening the resilience of ecosystems will make an important contribution to sustainable growth objectives.</i>
Social	The capacity of communities, institutions, or societies to anticipate, withstand, and recover from crises, including disasters, conflict, and inequality, while maintaining social cohesion and collective well-being.	<i>Culture will be supported as a catalyst for social inclusion, societal resilience and pluralism, peaceful coexistence and mutual respect.</i>

Even though the entry illustrates the conceptual complexity of *resilience* across the three pillars, a tabular format still doesn't represent the integrative relationship between these perspectives which is what gives *resilience* its specific meaning in sustainability discourse. We therefore argue that representing the integrative complexity of sustainability concepts requires a format that not only presents multiple perspectives simultaneously, but also makes their interconnections explicit. For this reason, we suggest that infographics, due to their multimodal structure, may offer a promising solution.

3.2. Using infographics for representing interdisciplinary knowledge

Previous research suggests that infographics can be an effective way of communicating sustainability, since they are informative, contextually relevant, and able to engage users with complex topics [16, 17]. As a communication medium, the infographic combines textual and visual elements in a compact, multimodal format that makes complex information understandable and accessible to audiences beyond specialist communities. They can visually organise multiple disciplinary perspectives, highlight shared elements and points of divergence, and make complex relationships easier to grasp. Infographics can also encourage environmental awareness and stimulate interest in sustainability-related issues [18, 19].

Compared to a traditional term entry, an infographic has several structural advantages that make it particularly suited to the representation of interdisciplinary knowledge. It can package larger amounts of information in a compact and navigable presentation; it can represent

¹ Source: euoparl.europa.eu corpus

multidimensional knowledge by displaying several disciplinary perspectives within a single visual space; and it can be adapted to the user's level and needs, giving learners the freedom to explore a relatively large amount of information in manageable, self-directed fragments. An interactive infographic, in particular, can function as an effective visual medium for illustrating a complex framework such as sustainability presenting the conceptual relationships between disciplines as an open structure that the user can interrogate from different entry points.

For these reasons, infographics have strong potential as a model for designing interdisciplinary terminographic entries, especially in a complex and multidimensional domain such as sustainability, where concepts must be presented as interconnected and evolving structures.

4. Final remarks and future work

This article has argued that sustainability education requires a form of terminography capable of representing concepts that are simultaneously disciplinary and integrative. Because sustainability is an interdisciplinary domain structured around three interacting pillars, environmental, economic, and social, many of its most frequently used terms function simultaneously as overlapping and bridging concepts, depending on the disciplinary context in which they appear. Standard terminology practice, grounded in the principle of monosemy and single-domain concept systems, is structurally inadequate for representing this kind of multi-referential, cross-pillar terminology.

By proposing an interdisciplinary term entry model and illustrating it with corpus-based evidence from the Europarl corpus, we have shown both the usefulness and the limitations of conventional tabular representation. While such entries can successfully display disciplinary variation, they remain insufficient for expressing the conceptual interconnections that are central to sustainability discourse. For this reason, we propose infographics as a promising representational format for interdisciplinary terminography, since they can integrate definitional diversity while making relationships between perspectives visible and cognitively accessible to learners.

Several limitations of the present study should be acknowledged. The corpus, while large, is restricted to a single institutional source domain and a single language. The EU parliamentary register, though integrative by design, reflects the normative and policy-oriented framing that characterises EU legislative discourse. The terminological behaviour observed in this corpus may differ from that found in scientific or educational texts. The term entry model proposed here is illustrative rather than exhaustive. It draws on three selected pillars to demonstrate the analytical framework, but a full interdisciplinary term base would require systematic coverage of the complete terminological inventory of each pillar.

Future work will focus on developing a structured methodology for designing infographic-based term entries, including principles for visualising overlap, conceptual transfer, and cross-pillar integration. This includes testing interactive infographic prototypes with students and teachers in sustainability-related programs in order to evaluate usability, learning outcomes, and pedagogical effectiveness.

Further research is also needed to refine criteria for identifying boundary objects and bridging concepts in corpora and to expand the model beyond single-term case studies to larger terminological networks. Ultimately, the goal is to contribute to a sustainability-oriented terminography that functions not only as a descriptive resource but also as a didactic tool supporting interdisciplinary learning and disciplinary integration.

The interdisciplinary term base proposed here is not intended as a reference tool for specialists but as a pedagogical resource for learners who encounter sustainability terminology in cross-disciplinary contexts. We believe that this reorientation of terminographic practice towards

pedagogical usability in interdisciplinary domains represents a productive direction for terminology studies in the context of sustainability education and beyond.

Declaration on Generative AI

During the preparation of this work, the author used ChatGPT-4 for grammar and spelling checks. The author has subsequently reviewed and edited the content and takes full responsibility for the publication's final version.

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