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Received: 11/02/2026

Revised: 29/06/2026

Accepted: 18/07/2026

Published: 23/07/2026

Special Issue:

Teaching Geography for a World in Transition - Powerful Teaching in Uncertain Times



Guest Editors:

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EJG Editor:

Dr Alexandros Bartzokas-Tsiompras

DOI: 10.48088/ejg.e.flu.17.2.338.345

ISSN: 1792-1341

E-ISSN: 2410-7433



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Short Communication: Geographic Insight in Brief

Engaging with the Wickedness of Education for Sustainable Development through Multimodal Vignettes in Teacher Education

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Abstract: This paper conceptualises Education for Sustainable Development (ESD) as a Wicked Problem and highlights the need to explicitly address its inherent controversy in geography teacher education. To engage with the content-related, pedagogical, and structural dimensions of this Wickedness as they intersect in everyday classroom practices, we propose multimodal vignettes as a promising casuistic tool for reflection. Drawing on the international project INTERACT, the paper outlines the construction of these vignettes and illustrates the approach through one specific vignette. First experiences from using the vignette corpus in different seminar contexts suggest that multimodal vignettes may support a shift away from solution-orientated approaches towards more reflexive engagement with the complexity, uncertainty, and contested nature of sustainability-related teaching.

Keywords: Wicked Problems; Education for Sustainable Development; Teacher Professionalisation; Teacher Education; Vignettes

Highlights:

- Wickedness of Education for Sustainable Development (ESD) as an analytical framework
- Multimodal vignettes as a tool for reflexive professionalisation in teacher education
- Supporting reflexive engagement with complexity, uncertainty, and controversy in ESD

1. Introduction

The concept of sustainable development occupies a central place in contemporary public discourse and is frequently framed as a response to the social-ecological crisis of our time. At the same time, its meanings and objectives remain contested and are continuously negotiated by diverse stakeholders with different interests, embedded in unequal power relations. Interpretations and implementation practices of sustainable development are thus found in a permanently controversial discourse, marked by multifaceted uncertainties and ambiguities, which opens up spaces for negotiation on desirable changes but cannot offer clear-cut solutions (Brand & Wissen, 2021; Murphy, 2012). This inherent controversy is not only characteristic of sustainable development itself but also crucial for an emancipatory idea of Education for Sustainable Development (ESD), which explicitly acknowledges its own political dimension (Vare & Scott, 2007; Pettig & Singer-Brodowski, 2025). While ESD is firmly embedded in school curricula across Europe, its realisation relies heavily on subject-specific contributions. Geography education, in particular, addresses a wide range of sustainability issues in an integrative way (e.g. Meadows, 2020; Hemmer et al., 2025). Nevertheless, the deliberate

engagement with controversy in subject-specific teaching and learning focusing on ESD remains rather underexplored. At the same time, many teachers experience the handling of controversial sustainability issues in their classrooms as challenging (e.g. Bengtsson et al., 2024). Empirical studies, therefore, underlie the need for professionalisation practices explicitly addressing dealing with controversy in the classroom, including that teachers are also aware of this need in general (Hess & McAvoy, 2015; Karousiou et al., 2025) and specifically in the context of sustainability (Breitenmoser et al., 2024; Costa & Singer-Brodowski, 2024).

Addressing this transnational challenge of ESD practice, the project INTERACT¹ (Tackling ESD related wicked problems in geography teacher training with multimodal vignettes) develops an innovative tool for teacher training – multimodal vignettes – integrated in different seminar concepts, which offer opportunities to engage with ESD-related controversies in teacher training, to foster dialogue and deep reflection and to discuss possible courses of pedagogical action. In this short contribution, we (1) will briefly conceptualise ESD as a Wicked Problem; (2) examine multimodal vignettes as a tool to engage with the Wickedness of ESD in geography teacher education; and (3) outline perspectives for further research.

2. Education for Sustainable Development as a Wicked Problem

Based on Rittel and Webber's (1973) definition of Wicked Problems as "a class of problems that are complex, contentious, defy complete definition and resolution, and for which there is no single solution, since any resolution generates further issues" (Rittel & Webber, 1973, 4), it seems reasonable to classify many issues of sustainable development as Wicked Problems and, in this context, to speak of Wicked Sustainability Problems. These problems are characterised not only by considerable epistemic uncertainties but also by conflicts of values and norms concerning both the definition of the problem and the appropriateness of potential solutions. As a result, they give rise to scientific, ethical, and political controversies that not only influence knowledge construction, political decision-making processes, and individual action but also converge in specific ways in teaching and learning (Block et al., 2019; Lönngren & van Poeck, 2021).

Accordingly, ESD can be understood as being shaped by several interrelated dimensions of Wickedness. The following dimensions are not intended as an exhaustive typology but rather as heuristic analytical lenses that highlight particular challenges arising in educational engagements with sustainability issues:

- 1. Content-related Wickedness** refers to the characteristics of sustainability issues themselves, including epistemic uncertainty, competing problem framings, contested interpretations, and ambiguity regarding appropriate courses of action and conflicts between different normative reference points, values, and visions of desirable futures (Murphy, 2012). Furthermore, the identification of sustainability challenges and the formulation of desirable futures are invariably shaped by divergent social interests and asymmetrical power relations (e.g. Skou Grindsted, 2013).
- 2. Pedagogical Wickedness** concerns the challenges that emerge when teaching and learning about uncertain, open-ended, and controversial issues. It includes questions of how to engage productively with complexity, disagreement, uncertainty, and contradiction in diverse educational settings (Biesta, 2013; Block et al., 2019; Mitchell, 2022; Hanke et al., 2022). These challenges are intensified by the fact that teachers and learners are not detached observers but personally affected and situated subjects whose experiences, values, identities and social embeddedness shape how sustainability issues are perceived, interpreted and negotiated, as well as the opportunities and constraints they encounter in responding to them (e.g. Felix & Clayton, 2025).
- 3. Structural Wickedness** relates to the institutional and organisational conditions under which sustainability education takes place (Mitchell, 2022). It becomes visible, for example, in tensions between existing structural and organisational conditions of current school education and the necessities of future-orientated educational settings in the age of the social-ecological crisis (Laub, 2022). With regard to higher education teaching in the context of ESD, Schlieszus, Weselek, and Siegmund (2024, 369) distinguish three types of role conflicts of university teachers: "one linked to the need to take personal stances, one linked to the conflict between public and private roles, and a third linked to institutional constraints".

Conceptualising ESD through the lens of Wickedness thus goes beyond descriptive categorisation and serves as an analytical framework that highlights the fundamental openness, conflictual nature, and contingency of sustainability-related questions. For educational practice, this perspective shifts attention away from clear-cut solutions towards the

¹ INTERACT (10/2023–09/2026) is an ERASMUS+ cooperation partnership, co-financed by the European Union, involving Dresden University of Technology (Germany), the University of Graz (Austria), and Fontys University of Applied Sciences Tilburg (the Netherlands).

reflection of uncertainty, power relations, and questions of responsibility, thereby framing contradictions, dissent, and ambiguity as constitutive elements of teaching and learning in ESD. Building on this, we assume that the three dimensions of Wickedness of ESD do not occur in isolation in teaching practice but overlap and mutually reinforce one another. Accordingly, we argue that teacher education should not address these dimensions of wickedness separately but engage with the ways in which they intersect and manifest themselves in concrete teaching situations. For doing so, we see particular value in case-based approaches to teacher professional learning.

3. Multimodal Vignettes as a Way to Engage with Wickedness in Teacher Education

Working with cases in teacher education has a long-standing international tradition (Darling-Hammond & Hamerness, 2002). However, the discourse on case-based education is highly diverse, varying in definition, format and purpose, with cases serving as real-world examples, narratives or reflective tools, presented in written, oral or multimedia forms, and created by either educators or student teachers (Ulvik et al., 2022). Here, we return to a specific and well-established method of case-based education across different contexts and disciplines, vignettes, which are valued in educational settings as they “are relatively easy to construct, they provide a useful focus and stimulus for discussion, they are valuable in addressing difficult-to-explore and sensitive topics, they can be used with individuals and groups, and they reflect real-life contexts and problems” (Jeffries & Maeder, 2005, 17).

In particular, our approach draws on a phenomenological tradition, in which vignettes are understood as short, dense narratives capturing moments of lived experience. Vignettes can thus be described as aesthetically condensed and situationally composed narratives of shared experiences (Agostini & Peterlini, 2022; Schratz et al., 2013). INTERACT expands this understanding by complementing such ‘thick descriptions’ with a range of different elements. The aim of multimodal vignettes is to open up new perspectives on these cases and to highlight the simultaneity and overlap of teaching processes (Ulvik et al., 2022).

The creation of the vignettes was informed by two exploratory research phases conducted in schools across Germany, Austria, and the Netherlands. In an initial phase of classroom observations and teacher interviews, we identified sustainability-related topics that teachers perceived as particularly challenging, uncertain, or pedagogically demanding. These topics were synthesised into a concept map, which informed a second phase of classroom ethnographies in geography lessons. Whenever situations reflected characteristics of wickedness according to our analytical framework, we enriched our ethnographic documentation by collecting additional material, including conversations with teachers and students as well as lesson artefacts. These situations formed the narrative core of the vignettes, which we condensed during the process of the vignette construction to render the captured moments experientially accessible to readers (Agostini & Peterlini, 2022). This is supplemented with additional excerpts from the same classroom situations, including interviews with teachers reflecting on their feelings before a lesson, their initial thoughts or how they perceived what happened in the lesson. Furthermore, we included photos and teaching material but also insights from conversations with students, their learning products or their statements on specific issues.

The multimodal vignettes were co-constructed through an ongoing dialogue among the researchers and participating teachers by assembling fragments from authentic teaching sequences in a mosaic-like manner. The construction was guided by different, literature-based criteria². These included their applicability in teacher education, their capacity to evoke resonance among readers, and to address Wickedness of ESD on different levels as well as their interwoven nature. While vignettes are inherently subjective – shaped by the individuality of perception and by their construction around a specific aim in mind (in this case, the Wickedness of ESD) – we see great potential in multimodal approaches to enhance their authenticity. The aim is not to produce a more ‘realistic’ and ‘complete’ depiction of the situation but rather to foreground multi-perspectivity in ways that open up room for ambiguities and contradictions, valuing the subjectivity of all actors and their relations involved. Rather than illustrating best or worst practices, then, our multimodal vignettes present a multi-perspectivity on complex, authentic teaching situations. Within this framework, pedagogical professionalisation is understood not as the gradual accumulation of knowledge and skills, but as an experience-based, inherently discontinuous, and reflexive learning process (Agostini & Peterlini, 2022; Schratz et al., 2013).

The final set comprises twelve multimodal vignettes³ based on authentic sustainability-related teaching situations from European classrooms. Rather than assembling an arbitrary collection of interesting cases, the final corpus was

². The Handbook with design criteria is available as Open Educational Resources on our project website: <https://interact.rfdz.at>

³. Vignettes are available as Open Educational Resources on our project website: <https://interact.rfdz.at/>

designed to cover a broad range of recurring manifestations of the Wickedness of ESD that emerged across the exploratory phases. The selected vignettes represent different sustainability issues, pedagogical constellations, forms of uncertainty, and tensions between content-related, pedagogical, didactical and structural dimensions. Together, they illustrate the diverse ways in which wicked sustainability problems become educationally significant. Each vignette is accompanied by additional material, such as a further classroom observation, offering readers a new perspective on the case. To encourage deeper engagement with the vignette and reflection on the ambiguity inherent in the case (Agostini & Peterlini, 2022) as well as readers' own beliefs and assumptions as part of professionalisation, each vignette is complemented by reflection impulses that address different dimensions of reflexivity. Building on the dimensions of self-, practice-, and meta-practice reflexivity (Schmidt & Wittek, 2020) and linking them to the Wickedness of ESD, the prompts encourage readers to articulate their initial impressions, critically examine the interconnected content-related, pedagogical, didactical, and structural challenges of the case (general reflection impulses), and reflect on vignette-specific tensions without prescribing particular interpretations (specific reflection impulses). Together, they are intended to strengthen reflective capacity and support the transfer of insights into participants' own teaching practice (Östman et al., 2019).

To illustrate both the construction principles of the corpus and the design of individual multimodal vignettes, we briefly introduce the vignette Global Plastic Pollution (see figure A.1). Based on a geography lesson on the wicked sustainability problem of global plastic pollution, with a particular focus on environmental injustice, the vignette exemplifies the guiding design principles of the corpus. Ethnographic observations, enriched into a thick description, are combined with classroom conversations, teacher reflections, student learning products, and follow-up responses collected two weeks later to create a kaleidoscopic view of the teaching situation. Rather than presenting a single, coherent account, these multimodal fragments foreground different perspectives and reveal the ambiguities and pedagogical tensions inherent in ESD. While the teacher intended to emphasise structural dimensions of environmental injustice, the collected materials show that many students primarily responded to the suffering of animals, illustrating the gap that may emerge between teachers' intentions and students' meaning-making. Instead of evaluating the lesson as successful or unsuccessful, the vignette invites readers to engage with these tensions through a series of reflection impulses. Beginning with an open general reflection impulse – *What becomes apparent when reading the vignette?* – the impulses gradually encourage deeper reflection on recurring challenges of ESD, including the role of emotions in sustainability learning, the relationship between personal care and structural analysis, and the negotiation of different perspectives. For example, one specific reflection impulse asks: *How can you acknowledge students' situated practices of care while doing justice to the complexities and power relations that constitute a situation?* Another builds on a student's anonymous statement that they "do not care about plastic pollution at all" and asks: *Is every viewpoint equally valid in pluralistic discussions, and if not, on what grounds can some viewpoints be considered more justified than others?* Additional materials, such as a conversation⁴ with the teacher provide further perspectives without privileging a single interpretation. In this way, the vignette encourages readers to critically examine both the case and their own assumptions and values as part of a reflexive process of professional learning.

4. Outlook

This paper argued that conceptualising ESD through the lens of Wickedness provides a useful analytical framework for understanding the complex, contested, and interconnected challenges that characterise sustainability-related teaching. In order to engage with the content-related, pedagogical, and structural Wickedness of ESD in their interconnectedness, we identify multimodal vignettes as a promising casuistic tool for reflection. By combining phenomenological vignettes with complementary perspectives, materials, and reflection impulses, the multimodal format aims to make the simultaneity of different perspectives, tensions, and ambiguities visible without reducing authentic teaching situations to predefined interpretations or solutions.

4. Part of the conversation talking about the students' opinions: **Observer:** [...] Do you consider that output to be just as legitimate as the others? Or not?; **Teacher:** Well, on a cognitive level, I find it equally legitimate, but emotionally, of course, I can't separate it from my own opinion. But I always think to myself when I'm at school that I have to be as neutral as possible and try to allow all opinions, and I think I usually succeed.; **Observer:** But do you think that something like "I don't care about pollution" can be justified – in ESD?; **Teacher:** [long pause] No, you can't really justify that. But hm, I don't know ...

Looking ahead, we assume that this multimodal approach offers particular potential for supporting professional learning in geography teacher education. While this paper illustrated our approach through the vignette on Global Plastic Pollution, these reflections are informed by our broader experiences of working with the complete set of twelve multimodal vignettes in different seminar settings. Our first experiences indicate that engaging with authentic classroom situations through multiple, interconnected perspectives may encourage participants to move beyond judging teaching situations and instead engage with questions concerning their own assumptions, the situated perspectives of different actors, and the interplay of content-related, pedagogical, and structural dimensions of Wickedness. In this sense, the multimodal format appears to create opportunities for self-, practice-, and meta-practice reflexivity. However, these first impressions remain exploratory and require more systematic empirical investigation. Future research should therefore examine how different multimodal elements contribute to reflexive processes across different teacher education settings and how they may support pre- and in-service geography teachers in engaging professionally with the Wickedness of ESD when teaching Geography for a World in Transition.

Appendix

VIGNETTE

Global Plastic Pollution



Co-funded by
the European Union

We are in an Austrian secondary school. The students are in the 9th grade and are between 14 and 16 years old. The topic of the lesson is global plastic pollution, with the teacher placing a special focus on the role of the Global South in this issue.

➡ The lesson begins and, after briefly addressing some typical organisational issues and allowing the students to settle down, the teacher asks the class: "What are the key messages from the → newspaper article [New WWF report: Global South bears tenfold cost of plastic pollution] that we read and worked on last lesson?" Some students respond: "90 % of all seabirds are threatened with extinction!" – "It's not very smart to pollute the ocean like that because many animals die." – "Plastic waste costs poor countries much more, and I think that's unfair." The teacher nods with satisfaction and hands out a → worksheet. In addition to many tasks involving classifying, explaining, and visualising various facts, the last task asks the students to design a 'talking plastic bag' that addresses global plastic pollution.



CONVERSATIONS WITH STUDENTS

While the students work on their designs, the teacher walks around the classroom and talks to them. She asks Nina what she means by "a clean future for everyone". Nina replies in an uncertain voice: "Well, for everything that lives. People everywhere, but also all the animals. Isn't that right?" – "Sure, of course, I was just wondering who you meant by 'everyone'!" – "Oh, right, exactly. Everything that suffers from it."

Leo also wants to talk about his design and explains: "It's a dead cat in a plastic bag... Because I once saw a dead cat in a plastic bag lying next to the road. It looked like it had really tried to free itself from the bag, and it was wrapped around its neck a lot, but it didn't make it. I can still remember it so well, it was really awful." – "Oh, I'm sorry." – "Yes, it was really awful. Since then, I really pay attention to plastic bags lying around somewhere."

After this intensive work phase, the lesson ends with some students volunteering to present their designs to the class. Five students volunteer, all of whom express that they find it unfair and distressing that animals around the world are suffering and dying as a result of plastic pollution.

REFLECTION OF THE TEACHER

At the end of the lesson, the teacher shares the following observation: "I find it interesting that we didn't actually do anything with animals and there is hardly anything about animals in the text, but that seems to be what triggers them the most. I think that at the age of 15, they are still very much on this emotional track. I notice in the lower grades that they are still much more receptive to animal welfare issues; there is simply much more empathy and less of an attempt to rationalise it. But yes, the people in the Global South didn't really come up at all."

➡ Two weeks have passed since this lesson, and the teacher decides to ask the students anonymously for their personal → opinions on the topic. Here is a selection of the responses:

Do you personally think plastic pollution is bad? If so, what do you find worst about it?	Do you think something should change? If so, what do you think should change? Who should act differently?
That people in the Global South suffer greatly from it and that we live as if there were more than one world.	The people who are involved in the production. Turning plastic into cardboard doesn't help.
Yes, I think it's terrible because animals die because of it.	There should be much stricter laws.
Yes, that many people are aware that it is bad, but they don't do anything and continue to throw trash, for example, on the ground.	Yes, people should deal with waste differently. More rules, use less plastic (except straws at McDonald's, for example).
No.	No.

The teacher and I look at the students' opinions together, and I ask them: "Do you think that every opinion that emerges after a lesson like this is equally valid for you? In other words, are you equally satisfied with each one?" This leads to a longer → conversation.

Figure A.1. Vignette: Global Plastic Pollution

Funding: This research was co-funded by the European Union, grant number 2023-1-DE01-KA220-HED-000153993; We acknowledge the financial support by the University of Graz.

Data Availability Statement: No research datasets were generated or analysed in this study. The paper draws on conceptual work and exploratory insights from teaching and learning contexts. The multimodal vignettes discussed are available as Open Educational Resources. The primary materials (e.g. classroom observations, interviews, photographs, and student artefacts) used to develop the multimodal vignettes were collected as part of the Erasmus+ INTERACT project. This paper does not analyse these original empirical materials but draws on the anonymised multimodal vignettes developed from them. The underlying project materials are not publicly available due to ethical and data protection considerations. Data collection followed the ethical procedures of the participating institutions.

Conflicts of Interest: The authors declare no conflict of interest.

Acknowledgments: The authors want to thank the editors and the anonymous referees who offered insightful and immensely useful critique of an earlier draft of this article. This article forms part of the Special Issue (SI_TGEO), [Teaching Geography for a World in Transition. Powerful Teaching in Uncertain Times](#), published in the European Journal of Geography. The Special Issue draws inspiration from the 2026 [EUROGEO Conference](#), held in Tilburg, The Netherlands, 21 to 22 May 2026. The collection brings together research on geography education and geographical inquiry, with a focus on powerful geographical knowledge, spatial thinking, and critical, future oriented pedagogies. Contributions address key transformations shaping contemporary geography, including deglobalisation, multipolar world orders, postcolonial critique, contested knowledge and places, and the integration of artificial intelligence in educational practice and research. The Special Issue is edited by **Dr Neli Heidari**, University of Bremen, Germany, **Dr Uwe Krause**, Fontys University of Applied Sciences, The Netherlands & Ege University Izmir, Türkiye, **Dr Susan Caldis**, Macquarie University, Australia, **Prof. Tine Beneker**, Utrecht University, The Netherlands, and **Dr Alexandros Bartzokas-Tsiompras**, National Technical University of Athens, Greece, & Associate Editor of the European Journal of Geography.



Contribution to the Special Issue Topics: As geography education seeks to prepare learners for an increasingly uncertain, fragmented, and contested world, teachers require opportunities to engage reflexively with complexity, uncertainty, and controversy. By conceptualising ESD as a Wicked Problem and proposing multimodal vignettes as a casuistic approach, this paper contributes to debates on pedagogies for complexity, uncertainty, and teacher agency in geography teacher education.

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