

Teacher Identity and Climate Change Education: Implications for Curriculum Integration in Indonesia

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Abstract

The aim of this study is to investigate the integration of climate change education into the curriculum in Indonesia from teachers' perspectives. Specifically, the paper will explore teachers' beliefs and values concerning climate change education as well as the integration strategies they prefer at the intersection of complex factors such as political, cultural, as well as institutional and individual considerations. Using the teacher environmental identity perspective, narratives about climate change integration from 21 teachers in Indonesia are analyzed. The findings are organized into four environmental identity constructs, namely, master storyteller, early adopter, reluctant implementer and discouraged believer. These constructs reflect the complexity of climate change integration while affording insights into the personal and professional dimensions of teacher identity, as well as relational aspects that merit consideration. Moreover, the findings point toward the curriculum constructs likely to

operate in this context that also present some challenges and opportunities.

Keywords: Climate change education, curriculum integration, positioning, teacher identity.

Introduction

Climate change education has been gaining prominence in the past few years to support efforts towards mitigation and adaptation. Hence, teaching about climate change at school is extremely urgent, requiring immediate reform in the education system (Anderson, 2012; Muttarak & Lutz, 2014). However, in a study conducted by UNESCO (2021), more than 60 % of teachers reported that they were not confident about teaching about climate change in their classrooms and 47 % of the national curriculum frameworks of 100 countries did not include climate change. The lack of curriculum reform as well as teachers' reluctance to teach about climate change reflects the complexity of the institutional and individual factors as well as the cultural and political contexts bearing on climate change integration. The aim of this study is to explore the intersection of these complex factors through the lens of teacher environmental identity.

As regards integrating teaching on climate change into the formal curriculum, climate change is a complex issue requiring teachers to transcend disciplinary boundaries (Eilam, 2022). Earlier research on climate change education indicates its initial focus on acquiring scientific knowledge and competences rooted in the subject-based organization (e.g., Rousell & Cutter-Mackenzie-Knowles, 2020; Tibola Da Rocha et al., 2020). The process indicated by concentration in some scientific subjects of relevance to climate change leads to various facts about climate change being scattered and disconnected (Cantell et al., 2019; Stevenson et al., 2017). This approach may inhibit pupils from making inferences and gaining a coherent understanding of the phenomenon and impair the growth of individual and collective agency (Bentz, 2020). Some scholars call for a better articulation of climate change specifically through the Education for Sustainable Development (ESD) framework that may support a more holistic approach to education (Anderson, 2012).

Recently, a bottom-up approach in climate change education has gained traction, engaging the participation of the communities of learners to formulate climate change projects and their response to the issue (Rousell, Cutter-Mackenzie-Knowles, 2020). This approach will require teachers to master basic knowledge about climate change, be able to organize a participatory process of learning and be empowered to implement it at their school. This will cause them to rethink how their disciplinary expertise may be relevant to climate change science. They may also need to reframe their education mission in light

of preparing their pupils for climate change mitigation and adaptation. They will, moreover, need to navigate tensions between the way learning and schooling are organized to support this purpose. In short, this approach will require the construction of a specific identity concerning climate change education.

This study explores how teachers in Indonesia construct their identity based on the understanding of teacher environmental identity. From this perspective, identity is viewed as a set of self-meanings that sustain and project who they are, how they feel and what they value about environmental issues (Meijers et al., 2016; Stets & Biga, 2003). This study aims to explore Indonesian teachers' responses to climate change. Specifically, the study explores teachers' beliefs and values concerning climate change education represented through positioning in their narratives. The study analyzes how the teachers describe the strategies they use and prefer for integrating climate change into the school curriculum. The questions to which the study seeks answers are as follows: (1) What are teachers' responses to climate change education? (2) What strategies do they prefer to integrate climate change into the school curriculum? (3) What kind of teacher environmental identities did the respondents in this study construct?

To answer these questions, the study analyzes narratives from 21 teachers in Indonesia, who taught at seven schools, including middle schools, secondary and vocational schools. The analysis explores teachers' beliefs and values concerning climate change education, which may reflect relational aspects that include somatic, perceptual, emotional, aesthetic, and spiritual aspects (Meijers et al., 2016). Furthermore, it explores teachers' positioning concerning integration strategies used or to be used in the future that reflect some deep-seated curriculum construct operating in the context. Thus, the study may help us understand how the intersection between the teacher environmental identity construction and underlying curriculum constructs operating in this context may create challenges and opportunities for climate change integration.

Conceptual Framework

The first section describes how teachers' environmental identity is used to highlight the complicated process that enhances or inhibits climate change education. The concept of positioning in this context is viewed concerning how it is used to articulate meaning and project particular beliefs and values about environmental issues. In the last part, narratives used in researching climate change and education are described, likewise their application in this study.

Teacher Identity in Relation to Climate Change Education

In climate change education (CCE), the teacher is one of the most important actors determining how successful its implementation will be. Thus, earlier

studies have utilized various concepts to analyze teacher factors that may support teachers in their role. These studies investigate teachers' competences, skills and attitudes toward climate change in relation to these agendas (e.g., Boon, 2016; Eze et al., 2022; Karami et al., 2017). However, these studies may be limited in describing the lived experiences, tensions and constraints that teachers face in integrating climate change (Almeida et al., 2018).

Increasingly, more studies utilize the teacher identity perspective to explore how teachers implement climate change teaching. For example, using a social construction perspective to explore teacher identity among teachers of geography on a university-based teacher education program, Rushton (2021) identified tensions and challenges in relation to Environmental and Sustainability Education (ESE), including climate change. This may be due to the complexity and controversial nature of climate change topics, which are difficult for teachers, especially the recently qualified. Similarly, Drewes (2020) proposed a development model of climate change teacher identity among science teachers. The model describes how climate change teacher identity development is influenced by personal, professional and political elements that change over time. Also, Raus and Falkenberg (2007), based on the notion of deep ecological movement, use the term "ecological self" to describe teacher identity that is embedded in natural ecology and view destruction of nature as destruction of oneself. These studies highlight the possibility for teacher identity as a construct to include diverse elements informing teachers' decisions to teach about climate change, navigate possible tensions and dilemmas as well as how they can be best supported and developed.

This study will use the concept of teacher environmental identity (Meijers et al., 2016) describing environmental identity as "dynamic multiplicity of personal positions or voices regarding the natural environment...it is a result of discursive processing of emotionally salient experiences (or boundary experiences) that occurred earlier in life...it can be said it is relational in many aspects: somatic, perceptual, emotional, aesthetic, spiritual" (p. 7). Based on dialogical identity (Hermans et al., 2010), teacher environmental identity in this study is dynamically constructed using diverse positions that reflect how teachers view the natural environment beginning with these relational aspects. Additionally, their positions also reflect their interpretations regarding teachers' role and their subjects in relation to climate change education, in short, their professional position. This positioning may be informed by subject-specific identity and disciplinary organization in the formal curriculum that may be challenged in climate change education (Eilam, 2022). Thus, the teacher environmental identity in this study also reflects how personal and professional positioning are used to construct it. Teacher identity in this context is also mediated by discursive processes, such as creating narratives and telling stories. In this study, this mediating role of

narrative as a means to articulate teacher environment identity is used as a basis for the methodological approach. The following section describes how the narrative approach is utilized in this study.

Narratives in Climate Change Research and Education

The role of narratives in researching and understanding climate change has been gaining prominence in recent years. This is probably due to how the crisis challenges our existing framework of understanding the world, hence, the need for a radical way to approach it. For example, storytelling can be considered to articulate the crisis as “visceral and material experiences” that “connect the out there with the here and now”, which in turn may support better policy formulation (Harris, 2017). Moezzi et al. (2017) argue for the merit of using narrative approaches instead of the previously dominating positivistic approaches; narrative may reveal different ways of knowing, researching and presenting evidence. In the context of this study, narratives from the respondents are used to explore these teachers’ experiences of integrating climate change education but also their experiences of climate change as a lived experience.

In education, narratives have been used widely as an approach to researching teacher identity. For example, in teacher education, narratives are used to gain insights into how student teachers construct their identity during the transitional period (Alsup, 2008; Izadinia, 2013). Narratives have, moreover, been widely used in researching teacher identity based on the understanding that narratives serve both as tools to articulate it and the medium where it is constructed (Akkerman & Meijer, 2011; Zen, 2023). Regarding climate change education, Singh (2024) demonstrates how utilizing stories in teaching about climate change can serve as onto-epistemological tools that allow for the inclusion of multiple points of view and resist dominant narratives. According to Bamberg (2010), identity is also constructed when individuals position themselves against the master narratives. Hence, when teachers position themselves concerning environmental issues, they may do so in agreement with or opposition to the narratives about climate change in their context.

This study is conducted as qualitative research, where narrative is used as a broad methodological approach to support a teleological understanding of teachers’ experiences in integrating teaching on climate change. Narratives are then used as the type of data that the study uses as well as the method to collect the data. Additionally, the analysis of the narrative is employed to identify themes, positions and strategies (Riessman, 2008). Narratives resulting from this approach may help us understand how teachers construct their environmental identity in relation to climate change education that includes their relational aspects such as somatic, perceptual, emotional, aesthetic, and spiritual

(Meijers, et al., 2016). Therefore, the narratives from the respondents provide insights into how they construct their identity in relation to climate change as a phenomenon lived as well as taught in their classrooms.

Site of Study

Leiserowitz et al. (2023) investigated how the Indonesian public perceived climate change, and the findings might provide relevant background to the context of this study. The respondents were 3,460 individuals aged 16 years and older. According to the result, almost 76 % of the respondents reported having little awareness of climate change. At the same time, they were also worried (25 % very worried, 47 % worried) and believed that they needed to take action (83 %). Although most of the respondents would like to be identified as “environmental activists” (70 %), when asked about various activism they engaged in, less than 20 % reported engaging in some type of eco-activism. While the issue causes considerable concern, there seemed to be little awareness among the respondents about climate change, yet it may not cause them to participate in activism.

Some of these gaps may be addressed through education, specifically by mainstreaming teaching on climate change within the formal education system that supports pupils’ agency. The Indonesian government began to integrate climate change education and disaster risk reduction into school curricula in 2010, and, finally, in 2013, teaching on climate change was formally included in the core competency of the national curriculum framework for primary and middle school pupils (Fujii, 2022). However, it has emerged that neither climate adaptation nor disaster risk reduction has been consistently addressed in the school curriculum due to the lack of support for teachers, financial constraints on its implementation and the fragmented education system (Nurdin et al., 2017). As a result, secondary school pupils in Indonesia still do not fully grasp the causes and impacts of climate change in Indonesia and rural pupils have even less understanding about this topic (Dewi & Khoirunisa, 2018; Nugroho, 2020).

This wider context regarding climate change awareness and education policy in Indonesia indicate an urgent need for it to be part of the learning process in the country. Yet, from the description above, we can identify in this study significant challenges for teachers to teach about climate change. This study further explores how teachers construct their environmental identity in this context that may shed light on how they confront these challenges.

Methodological Approach

Narrative interviews as a method to gain data in this study is used to provide a way for teachers to reflect and articulate their experiences in teaching about climate change or their response to teaching it (Anderson & Kirkpatrick, 2015; Craig, 2007). The interview events serve as conversation and stimulate narratives from teachers about climate change, teaching and learning, curriculum work, school activities related to education for sustainability and other topics deemed relevant by teachers.

Data Gathering

The interviews were conducted in seven schools, including four middle schools, one upper secondary school and two vocational schools. The schools are located in three regions, namely, Aceh (four schools), Riau (two schools) and South Sulawesi (one school). Some of these schools are already affiliated with the Green School Program organized by the Indonesian Ministry of Environment and Forestry (four schools). While three schools are organizing their own green school projects as part of the school activities. The schools where the study was conducted are then considered to be familiar with environmental and sustainability education (ESE) to implement it to a certain degree. However, climate change education may not yet be part of the school policy and not all teachers are familiar with the terms.

The respondents of this study were twenty-one teachers (21), almost equally divided between middle schools and secondary/vocational schools (see Table 1). The schools were selected due to their implementation of Green School Project. The project may be organized independently or organized in accordance with the Ministry of Environment and Forestry program. The respondents were teaching diverse subjects at the middle schools and secondary schools, while for vocational schools, some of the respondents were also teaching practical subjects related to forest management and other subjects. The selection of the respondents was conducted by the schools to reflect the diversity of subjects to avoid a preponderance of any specific discipline and to gather narratives from different perspectives.

Table 1

Number of Respondents by Type of Schools

No	Type of school	Number of respondents
1	Middle school	12
2	Upper secondary school	2
3	Vocational school	7
Total		21

The interviews were conducted by the third and fourth authors of the paper. Each respondent may have been interviewed by one or two interviewers depending on the situation. Each interviewer used the same guidelines for the interviews, including the themes to be addressed. The guidelines also contained instructions on how to focus on respondents’ narratives and support their elaborations. However, the way interviews unfolded might depend on how the interviewers elicited longer narratives from the respondents as well as the willingness of the respondents to describe and expand on their narratives. Average interview duration was 47 minutes per respondent. The total interviewing time for 21 respondents was 800 minutes. The interviews were then transcribed by the interviewers for further analysis.

Data Analysis

The analysis was conducted by the authors of the paper. We read through the transcriptions and conferred on the themes emerging. Teacher identity constructs in the findings were constructed in consultation with the interviewers, especially in relation to the additional contexts of the schools and the respondents. The analyses were based on the analysis of narratives (Polkinghorne, 1996; Riessman, 2008) to identify the themes inductively derived from the data. The analysis began by reading through the entire transcription and identifying themes across participants. The conceptual focus for the first phase was to identify themes in the respondents’ narratives. The themes might be related to classroom activities, observation and experiences of the impacts of climate change on their community, curriculum work at the school and various programs implemented at the school related to climate change mitigation and adaptation.

The second phase included a more detailed analysis of positioning conducted by the first author of the paper. The narrative segments representing the themes were then analyzed further to identify respondents’ beliefs, values and actions that might be represented by their positioning. For this purpose, we also used a

positional analysis to identify how respondents positioned themselves in relation to climate change education (Wortham, 2000; Zen et al., 2021). In addition to their own positioning, the positional analysis was also conducted to identify how respondents described the relationship between climate change and their own respective subjects and how they positioned their pupils in relation to climate change education. Findings based on these analyses were organized according to how respondents positioned themselves and how they described their preferred strategies to integrate teaching on climate change. Then we constructed four environmental identities for the teachers based on these findings to describe the scenarios that these identities might enact in relation to CCE.

Findings

The analysis of respondents' narrative indicates two broad themes related to the positions used by the participants in their narratives and their descriptions of their integration strategies. The positions that respondents used in their narratives were arranged in relation to their perceived knowledge about climate change and their personal beliefs, resulting in four teacher environmental identities. These identities are constructed by utilizing diverse positioning, including their personal positioning related to spirituality and local knowledge reflecting the human–non-human interaction. Then strategies they used were also included in the four constructs reflecting how they might enhance or inhibit climate change education.

Teacher Positioning Related to Perceived Knowledge About Climate Change

The participants used various positions in relation to knowledge of climate change and how they described their mastery of it. The respondents were asked to describe what they understood about climate change and how they perceived the impacts. In their narratives, the respondents used positions indicating their level of knowledge such as “Not knowledgeable” and “Moderately knowledgeable”. Table 2 presents excerpts from their narratives.

The quotes presented in Table 2 indicate a diversity of the positioning of teachers in relation to how much they know about climate change. The first quote is about a teacher who felt that he was ‘left behind’ regarding the information about climate change, indicating rapid change in information about climate change and that he has no tools to process the information. The second respondent positioned herself as moderately knowledgeable and described climate change in relation to the observed weather phenomena where she lived and her experience of the impacts. There were also statements indicating possible uncertainty, for

example, ending a statement saying, “that is all I know”, as well as statements such as “I apologize” may indicate a feeling of guilt. The respondents felt that they ought to know more about climate change, but they did not. These statements may reflect their beliefs about teachers assuming the responsibility for teaching about climate change. The teacher who positioned herself as knowledgeable provided a more complex definition of climate change and clearly indicated the role of humans as the cause of the crisis. The respondent also provided examples related to her subjects, the description of impacts may also be based on her discipline.

These statements may indicate that being able to teach about climate change well in any subjects required both mastery of its content and the agency to teach it. This ability to articulate climate change from a disciplinary perspective required both mastery of the subject and of climate change science, and this is a crucial aspect of agency in teaching about climate change. The statements, moreover, indicate that these teachers believed that climate change was important and that they were not fulfilling their obligation for providing good teaching about it. Thus, the statements also point to possible challenges in teaching about climate change. The first challenge may also be due to the diverse and complex information surrounding it, secondly, the rapid changes in the knowledge of climate change itself. These factors may inhibit teachers from even beginning to understand the phenomenon, as the first teacher described himself as “being left behind”. This may also have led the teachers moderately familiar with climate change to use simplified examples and tropes about climate change at the expense of omitting some important elements such as the role of humans and how it can be related to their own role and subject.

Table 2*Teachers Positioning in Relation to Climate Change Knowledge*

Quote	Translation	Analysis
Pertama sekali memang saya kurang tahu...kurang paham... karena kenapa...mungkin yaa karena saya tertinggal informasi juga (Guru Olahraga dan Pendidikan Kesehatan, SMP)	First of all, I don't know about it (<i>climate change</i>), not understand...why...well, maybe because I am left behind, in terms of information about it (sports and physical education teacher, middle school)	Positions self as not knowledgeable. Belief: not able to catch up. Expression used: left behind.
Yang saya pahami mengenai perubahan iklim itu terjadinya suatu kondisi dimana lingkungan kita mengalami perubahan, misalnya : terjadi pemanasan global....seperti yang kita ketahui musim dinegara kita itu ada dua, yaitu musim kemarau dan musim hujan. Dulunya itu di bagi per enam bulan sebelum terjadi pemanasan global, sedangkan sekarang tidak menentu cuacanya. Itu yang saya pahami ibu, mohon maaf.	What I understand about climate change is that it is a condition where our environment is experiencing changes, for example, increased temperatures...as we know there used to be two seasons in our country, the dry season and the rainy season. It used to be roughly 6 months long for each, but nowadays it is not so clear. That is what I understood, I am sorry (civic education teacher, middle school)	Positions self as moderately knowledgeable. Belief: climate change causing weather anomalies. Feeling: unsure, apologetic.
Sepengalaman saya Perubahan iklim adalah menurunnya daya dukung lingkungan akibat ulah manusia, baik dilakukan pemerintah dan masyarakat untuk meningkatkan ekonomi dengan membuka lahan-lahan untuk pabrik. Di dunia kehutanan ada istilah deforestasi yaitu hilangnya hutan akibat alih fungsi lahan yang terus meningkat. Itu terasa sekali contoh perubahan iklim, musim, banjir, tanah longsor dan kenaikan suhu udara.	What I understand about climate change is the decrease of the Earth's ability to sustain life because of human action, economic activities both by government and community, clearing forests for factories. In forestry there is a term called deforestation, the loss of forest due to conversion and it is increasing. The (<i>impacts</i>) can be felt such as weather anomaly, flood, landslides and higher temperatures (forestry & agriculture teacher, vocational school)	Positions self as knowledgeable. Belief: climate change due to human activities and causes disasters. Strategy: using examples related to the subject taught.

Teacher Positioning Related to Personal Beliefs

There are some positions indicating personal beliefs related to spiritual and local identity. For example, in the narrative excerpts below, the respondent positioned herself as ‘worshipper’, where she indicates how teaching about and preserving the environment are intertwined with an act of worship. The spiritual dimension in teaching about climate change is important as it deals with existential threat. Furthermore, the position as “observer of local tradition” is related to the local practice of planting a tree when one child is born in the family and traditional knowledge about farming practices. These positions indicate the relationship between human, community and nature (see Table 3).

The teachers in Table 3 reported their positioning in relation to spiritual beliefs, traditional practices and their role in the local community. These positions are part of teachers’ identity that influence their understanding of climate change and are shaped by their experiences and observations of its impacts on their surroundings. The positions may also provide an important source of motivation as one teacher referred to teaching about climate change as an act of worship. Based on this positioning, she also believes that some practices related to climate change mitigation and adaptation, such as tree planting, can be considered an action for the good of the community. She then used a similar perspective to encourage her pupils to view their acts of preserving the environment as part of their contribution. This spiritual dimension may be a previously unexplored area in climate change education and may enable the inclusion of diverse worldviews.

Some of the traditional practices in the community also aligned with and supported sustainable living. One teacher described the traditional ritual of planting trees when a child is born. This indicates an equal relationship between human and non-human, the ritual seems to honor the fact that humans will use their environment to live in; thus, planting trees is viewed as a way to balance the relationship. Another teacher described the uncertainty faced by the farmers in his community in relation to their schedule due to unpredictable weather. These farmers previously used a traditional method to determine their schedule, which is no longer applicable due to the disruptions. Hearing these farmers convinced the informant of the importance of including climate change in learning at school. Thus, he advocated having a specific subject included in the curriculum to teach about the phenomenon.

Table 3

Personal Positioning in Relation to Climate Change

Quote	Translation	Analysis
Indonesia perlu kegiatan menanam karena hutan kita sudah habis, agar lingkungan kembali baik. Kalau tidak, kegiatan menanam tidak akan ada karena hutan sudah habis. Saya sampaikan ini bukan Cuma ilmu tetapi juga ibadah (<i>menangis</i>). Program sekarang dimana-mana menanam tapi apakah berhasil? Menanam artinya memelihara kembali keberfungsian hutannya, belajar teori dan menerapkannya. Dan itu amal ibadah lho bu, amal jariah untuk kalian anak-anak. Karena tumbuhan dan pohon menghasilkan O ₂ (oksigen), O ₂ yang dihasilkan dibutuhkan oleh semua makhluk hidup dimuka bumi, itu jd benar-benar menjadi pahala dan amal jariah. (Guru Agro Forestry, SMK)	We need to plant more trees, our forests are gone. If not, there will be nothing left to harvest, because it's gone. I convey this message to the pupils; I am not only imparting knowledge but it is also my way to worship (<i>crying</i>). There are plenty of programs for re-planting the trees, does it really work? When we plant, we sustain the function of the forest, to learn the theories and then practice it. Planting is also worship, it is their (<i>the pupils'</i>) continuous charity. Trees will produce oxygen, and this is needed by all living things on this Earth, so it will be our reward and our charity. (Agro forestry teacher, vocational school)	Positions self as worshipper: Believes that teaching about climate change is worship. The respondent also believed that planting a tree is a form of worship. Positions pupils as worshippers. Emotion expressed: sadness.
Orang Melayu itu punya kebiasaan jika lahir anaknya maka dia akan tanam pohon 1, itu tradisi org melayu, bunga juga boleh. Itulah bu yang bisa saya lakukan, kalau lebih dari itu gimana ya, disini orang tuanya banyak yang punya sawit dan sebagainya. (Guru Kimia, SMK)	Malay people have a practice, when a child is born, then the parents will plant one tree, that is, the Malay tradition, a flowering plant may work too. That is what I do, beyond that I don't really know, (<i>because</i>) some of our pupils' parents own palm oil plantations. (Chemistry teacher, vocational school)	Positions self as part of Malay tribe. Belief: local tradition aligns with sustainable practices. Positions students as plantation owners. Describes teaching dilemma between preserving forests and land conversion for palm plantations. Emotion expressed: conflicted.

See next page for continuation of table

Continuation of Table 3

Quote	Translation	Analysis
Saya rasa itu sangat penting bu, apalagi lihat kan kondisi cuaca sekarang berubah, kemudian curah hujan yang udah meninggi, Kemudian cuaca ini nggak bisa terprediksi lagi, saya sering duduk juga di kampung, sering bercerita katanya kita nggak bisa menduga lagi kapan harus turun bercocok tanam. Kapan harus panen, kalau dulu kita bisa melihat dengan bulan, tapi kalau sekarang sudah sangat tidak ter prediksi, berarti dunia sekarang sudah berubah, itu bahasa orang kampung. Nah...saya pikir itu sangat penting dimasukkan ke suatu pelajaran. Malah kalau perlu harus ada semacam satu pelayanan khusus ya, apa yang bisa di masukkan dalam muatan lokal (Guru Sosial, SMP)	I think it is very important due to our current weather situation, it is changing. The rainfall is very high, and the weather is unpredictable. I sat down with (<i>farmers</i>) in our village, they told me that they can't predict the weather anymore, and are not sure when to start planting their fields and when to harvest. We used to be able to tell by the moon, but now it is unpredictable, the world is changing, that is how they say it in the village. So...I think it is important that we include this issue. I think it is better if there is one specific subject or something that can be included in the curriculum. (social sciences teacher, middle school)	Positions self as part of village community and Acehnese. Belief: climate change is an important topic to be included in the curriculum. Strategy: one specific subject. Describes disruption of local farming practices due to unpredictable weather.

These positions also indicate the tensions the teachers were facing in teaching about climate change. For example, one teacher faced a dilemma when teaching pupils whose parents worked on the palm oil plantation, and this created tension that she had to address on a daily basis. Additionally, the feelings such as sadness, being conflicted, and confusion expressed in the teachers' narratives indicated tensions that are commonly found in teaching about climate change issues. The phenomenon was difficult to grasp and triggered emotional responses that might lead to teachers avoiding teaching it. However, these positions and emotions also indicated possible avenues for teachers to explore climate change issues in their classrooms in relation to specific local impacts, traditions, and spiritual beliefs. These quotes indicate that alternative worldviews may provide a wider perspective for pupils to view the phenomenon and explore solutions that might be more relevant for their sensibilities and rooted in their way of living.

Teacher Positioning Reflecting the Perceived Relationship Between Their Subject and Climate Change

The analysis also revealed several positions adopted by the respondents that reflect how they conceptualized the relationships between climate change and the subjects they taught (see Table 4). These positions may reflect subject organizations and a curriculum construct that is common in this context. For example, the terms "topical reference" or "limited link", or "direct link" indicate the need for teachers to perceive and understand the relationship between climate change and their subjects. Similarly, there are also terms such as "paste to subject" and "there is no direct link" to describe how respondents viewed isolated phenomena beyond the purview of their subjects.

Table 4
Teachers Positioning of Climate Change Relative to Their Own Subject

Quote	Translation	Analysis
Kalau dengan pelajaran tidak (<i>integrasi isu perubahan iklim</i>), susah dengan matematikanya...Paling ke pola hidup, jangan ikut-ikutan nambah polusi, kalau bisa mulai menanam di rumah...Mungkin perlu (<i>memasukan perubahan iklim</i>), tapi jangan dibebankan kepada guru, karena saya juga masih bingung cara menyipkannya, dipikirkan juga polanya, masuknya ke mana gitu, ke materi apa, atau metode apa (Guru Matematika, SMA)	I do not specifically (<i>include climate change issues</i>) in my lessons, it is difficult to do that in Math...At least, I promote lifestyle changes such as not adding to pollution, start planting at home...maybe it is necessary (<i>to integrate climate change</i>), do not burden the teacher though, because I am still confused how to do this, where to integrate it, which topics and what method to use. (Mathematics teacher, secondary school)	Positions self as overburdened. Positions self as promoting lifestyle changes. Belief: climate change is not related to her subjects, based on topical relevance. Emotion expressed: confused.
...Kalau penting (<i>atau</i>) nggak pentingnya kita harus tahu dulu kontennya nih apa, gitu. Kalau secara umum mungkin perubahan iklim, kalau saya sendiri pening, tapi apakah itu nantinya dijadikan satu mata pelajaran tersendiri atau nempel-nempel di pelajaran yang lain? Itu terserah, tapi menurut saya penting untuk perilaku anak-anak gitu...Tergantung mungkin juga kebijakan dari sekolah. Dulu juga pernah ada Pendidikan Lingkungan Hidup... Hilanglah ditempel ke IPA... Jadi memang kayaknya harus ada apa ya? Kayak gitu lah. Kita mah hanya pelaksana...jadi kalau instruksinya seperti ini, ya dilaksanakan. Tapi, kalau saya pribadi ya ditanya penting atau nggak penting, saya mah penting. (Guru Agama, SMK)	...Whether it is important or not, we need to know the content first. In general, climate change for me is personally important. Does it have to be one specific subject or integrated into other subjects? It could be either way, but I think this is important to change pupils' behavior... this will also depend on school policy. We used to have Environmental Studies...then it is gone, integrated into science subjects...so, there should be something in place? I don't know. We are just implementers...so if the instructions are this way, then (<i>we will</i>) implement them. Personally, I think it is important (<i>to be included</i>). (teacher of religion, vocational school)	Positions self as an advocate of climate change education. Belief: CCE could influence pupils' behavior. Positions self as a curriculum implementer at school. Positions pupils as passive objects to be shaped. Strategy: specific policy from the school to instruct teachers on integrating climate change issues, referring to a similar policy for ESD in the past.

See next page for continuation of table

Continuation of Table 4

Quote	Translation	Analysis
Dalam mata pelajaran Kimia ada materi yang berhubungan langsung dengan masalah isu lingkungan seperti hidrokarbon, kimia organik...Dengan kita tidak bijak dengan lingkungan maka hidrokarbon akan berkurang, ini adalah salah satu senyawa yang ada di bumi kita. Bila kita tdk bijak akan menyebabkan efek rumah kaca, polusi. Hidrokarbon ini terdapat didalam bahan bakar fosil sementara kita masih pakai bahan bakar fosil, karena banyaknya CO2 yang menyebabkan pemanasan global. Isu ini sering kami kaitkan dengan isu lingkungan...Kalau lagi belajar anak-anak terpanggil, anak-anak marah, tidak suka keadaan alam rusak parah. Saya minta mereka presentasi isu lingkungan yang dihubungkan dengan pengetahuan yang sudah dipelajari. (Guru Kimia, SMK)	In chemistry, there are topics directly related to environmental issues such as hydrocarbon, organic chemistry...when we are not wise (<i>in relating these</i>) to the environment then there is reduced hydrocarbon, which is one of the substances on our Earth. If we are not wise then it will cause greenhouse effect, pollution. This substance is part of the fossil fuel that we are using, the carbon dioxide produced will exacerbate global warming. We link this topic with environmental issues...When we learn (<i>this way</i>), pupils feel activated, they are angry that the environment is damaged. Then I asked them to present about this issue and link it to the knowledge gained in the lesson. (Chemistry teacher, vocational school)	Positions self as a chemistry teacher. Believes that climate change has a direct link to chemistry as a subject. Strategy of using environmental issues and eliciting students' reactions and activating them. Positions pupils as environmental activists.

The excerpts from the respondents described the relationship between climate change as an issue and as a phenomenon in relation to their subjects. Their views were mostly based on the relevancy of the content of their subjects for some aspects of climate change issues. For example, the chemistry teacher above described how some topics in chemistry can explain global warming scientifically and the role of human activities in increasing the number of harmful substances. She was able to activate her pupils and engage them in the lesson by stimulating their emotions.

However, other teachers may face difficulty although they personally agree that climate change is an important issue to be taught in the classroom. From the quotes, agreement may be implicit in their positioning in relation to teaching about climate change, mostly endorsing and promoting climate change education. In Table 4, the mathematics teacher and the religious subject teacher highlight the importance of teaching about climate change to influence pupils' behavior. They encouraged simple practices and changes in lifestyle that the pupils could implement in their lessons. However, they did not use their lessons as platforms to introduce more substantial changes from the perspective of their discipline.

The positioning in relation to the respondents' role as teachers and the school curriculum is also revealing, as it sheds light on how teachers construct their relationship with the curriculum. For example, one respondent used the position as 'implementer' and waited for further instructions. This may indicate that teachers' positioning in crafting their school curriculum may be more passive than active. Hence, their exploration and agency for integrating climate change may also be limited. These positions may also reflect the way teachers are positioned in relation to shaping and influencing the school curriculum and how they exercise their agency in this matter.

The findings described diverse positions that teachers used in their narratives and these positions indicate the complex relationship between climate change, curriculum constructs that operate locally, and how the impacts of climate change affected the communities where the respondents lived. The following section will describe how the respondents described in more detail the strategies they used or would use to integrate climate change into their teaching.

Climate Change Integration Strategies

The respondents in this study came from schools already familiar with ESD. Some respondents were working at forestry vocational schools, others at schools affiliated with the Green School Program initiated by the Ministry of Environment and Forestry. Additionally, there were respondents from schools that had already begun mainstreaming ESD and climate change issues at their school activities and programs. Therefore, some of these respondents may already have been familiar with integrating ESD issues into their school curriculum.

In this section, respondents' narratives about integrating both ESD and climate change will be described. Most of the respondents supported integration into relevant subjects. This strategy is mostly based on the understanding of climate change from the perspective of the natural sciences. The following excerpts may provide descriptions on how they did it.

Table 5

Integration Strategy for Individual Subjects

Quote	Translation	Analysis
Ada, Ketika materi suhu ada terkait dengan perubahan iklim... kemarin di anak kelas tujuh ada saya sampaikan perubahan iklim. Salah satunya terkait dengan iklim ialah alat ukur suhu... Itu hanya sebagai apersepsi saja, bukan indikator dalam pembelajaran (Guru Fisika, SMP)	I did include climate change... in the 7th Grade I taught about climate change in relation to using a thermometer to measure the temperature... (climate change) is part of the introduction to the lesson, not part of the learning objectives. (physics teacher, middle school)	Positions self as a physics teacher. Strategy: topical reference, climate change as an introductory example. Goal: competences in physics. Beliefs: learning objectives tied to subject competence.
Untuk isu perubahan iklim saya melakukan metode pembelajaran berbasis project. Saya meminta siswa dan mengajak mereka membandingkan lingkungan di hutan-hutan itu... Terutama di Riau yang banyak ditanam sawit, jadi mengajarkan mengambil jalan tengah antara menanam dan mengambil manfaat dari hasilnya untuk ekonomi... Mengajak siswa untuk peka terhadap kondisi sosial disini sudah ada yang berhasil, kmrn ada team jangka benah. Tim ini memantau lahan rusak seperti sawit lalu dihindarkan kembali tanpa harus berurusan dengan pemerintah atau masyarakat. (Guru Agro Forestry, SMK)	To teach climate change issues, I use project-based learning. I asked my pupils and took them to compare the environments of different forest areas...especially in Riau province, which has many palm plantations, so I tried to teach them the middle way between planting and reaping the economic benefit (<i>from the forest</i>)...(<i>I want</i>) to help pupils to become aware of the socio-economic conditions of their surroundings, and it works, we created a 'Jangka Benah' team. The team will identify a plantation area that is damaged, then restore it independently without dealing with the government or community. (agro forestry teacher, vocational school)	Positions self as a teacher of climate change. Strategy used: project-based learning. Goal: pupils made aware of socio-economic issues. Beliefs: middle way of using the forest. Positions pupils as active agents.

In Table 5, we can identify two different ways in which climate change was integrated into the natural sciences teaching. The first quote indicates a more superficial mode of integration, where climate change is used as an example phenomenon where it may provide examples of how the temperature anomaly can happen. The main topic is measuring temperature to enable the pupils to use a thermometer. The second quote indicates a more embedded mode of integration, where climate change is used as a perspective to observe the condition of the forest in their surroundings, which includes its social impacts.

The difference of these modes of integration may be due to different levels of schooling where the teachers taught, namely, middle school and vocational school. However, it may also indicate how teachers understood climate change, then used this understanding to emphasize relevant aspects of it in their teaching. In the second model, the embeddedness of climate change was more prevalent in the way it informed the main principle that the respondent described as the middle way. The teacher also seemed to be adept at using the local context to stimulate actions, by juxtaposing forest and plantation to highlight the principle of “the middle way”. The features of climate change that the teachers were most familiar with seems to be the point of departure for them to integrate it. In the natural sciences, teachers might find it easier to identify relevant topics to be linked to climate change. However, if the teachers were only familiar with some basic features and lacked a more sophisticated understanding of it, the teachers would be more likely to use it as a passing reference as was the case with the first respondent.

In Table 6, the respondents describe their preferred integration strategies for integrating teaching on climate change into the national curriculum framework. Most respondents agreed that climate change needs to be included in the national curriculum framework, although they preferred clear guidance and instructions that they could interpret locally. The following excerpts may provide some examples of the integration strategy.

Table 6*Integration Strategy to the Whole Curriculum*

Quote	Translation	Analysis
Memang bukan kita yang melakukan perubahan kurikulum tapi maunya...kemendikbud mengintegrasikan ini baiknya langsung dimasukkan ke silabusnya, biar guru nggak kesulitan untuk mencari mana materi yang esensial/cocok kita integrasikan itu...kurikulum yang baku yang sudah ada dari pusat, kami guru tinggal susun RPP karena sudah ada pedoman.... jadi kami guru tinggal menyusun tujuan pembelajaran...sudah ada silabus tinggal susun tujuan sesuai indikator. (Guru PPKn, SMP)	We are not the ones who change the curriculum but (<i>I wish</i>) the Ministry would be the one who integrates this topic, better yet, directly into the syllabus, so teachers will have no difficulty to identify which topics are essential and relevant to integrate... the core curriculum issued by the government, we the teachers will create lesson plans because there is guidance... so teachers will construct lesson objectives...there is a syllabus so teachers will create lesson objectives based on the indicators. (civic education teacher, middle school)	Positions self as an implementer. Positions others: government as a curriculum maker. Assumes linearity in curriculum construction. Integration mode: pre-selected relevant topics
Saya berharap ada lebih ke penjelasan tentang formula perubahan lingkungan yang berupa proyek besar. Kalau ditingkat sekolah dasar harus lebih sederhana pengintegrasianya demikian terus makin kompleks di level SMP dan SMA atau Perguruan Tinggi. Kurikulum kita ke depan adalah kurikulum Merdeka Belajar yang ada proyeknya sebagai (basis pembelajaran), jadi muatan perubahan iklim sebaiknya dimasukan ke sana. Jadi bukan cuma rencana saja tapi real (nyata). (Guru Forestry, SMK)	I would like more explanations about climate change as a big project (<i>school-wide</i>). At elementary school, it may be not as complex, but it will increase in complexity at middle and secondary school and even at a university. Our curriculum is “Kurikulum Merdeka” (Emancipated Curriculum) which utilizes project-based learning, so climate change issues should be integrated into the curriculum. So, it will not remain a plan, it will be real. (forestry teacher, vocational school)	Positions self to endorse climate change integration. Prefers integration to formal curriculum. Strategy for integration through project-based learning. Integration strategy though project-based mode.

Both the respondents in these quotes agree and support climate change integration into their school curriculum for all subjects. The first respondent, however, suggests more specific guidance and instructions in relation to relevant topics. The mode of integration seems to rely on the government creating the core curriculum which then proceeds through a linear process of curriculum work where teachers create specific lesson plans based on the formal curriculum. The respondent takes a more passive role, waiting for pre-selected topics and specific instructions. Meanwhile, the second respondent comments on the recent changes where the “emancipated curriculum” is starting to be implemented at some schools in Indonesia and will be implemented at her school in the near future. This curriculum supports project-based learning, which requires teachers to be adept at recognizing the complexity of climate change and able to integrate this complexity into their teaching. The respondent still thinks highly of the government’s endorsement to integrate climate change into the curriculum. However, she took a more active role in deciding how and when to integrate climate change through diverse projects.

In this section, the respondents described various modes of integration and strategies that they used or intended to use in integrating climate change. The strategies described indicate diverse conceptions of climate change as a topic that reflects the curriculum construct operating in this context. In the following section, we will discuss how these findings were used to create four different teacher environmental identities that might enhance or inhibit climate change education.

Discussion

By analyzing teachers’ positioning and strategies, we constructed four teacher environmental identities that reflect diverse integration scenarios. These identity constructs are considered to be projected in relation to environmental issues (Meijers et al., 2016; Stets & Biga, 2003). The following section will describe four teacher environmental identities in more detail.

Teacher Environmental Identity Constructs in Relation to Climate Change Education

The four identity constructs reflect the complex relationship between teachers’ beliefs and values regarding climate change, their understanding of how to integrate climate change into their own subjects, as well as their observations and experiences of its impacts in their respective contexts (see Table 7). These positions reflect the complex intersectionality between relational aspects such as somatic, perceptual, emotional, aesthetic, and spiritual with the

curriculum construct, teachers' agency and knowledge about their own subject, as well as their understanding of climate change. Our intention in creating the four constructs to describe teacher environmental identity is to explore the diverse scenarios that may reflect this complexity. These identities may not be represented by specific respondents, but more as combinations of diverse positions and strategies that point to possible integration scenarios.

Table 7

Four Teacher Environmental Identity Constructs

Master Storyteller	Early Adopter	Reluctant Implementer	Discourage Believer
Believes in climate change	Believes in climate change	Believes in climate change	Believes in climate change
Integration of CC is highly important	Start to integrate CC	Not yet integrating CC	Does not integrate CC
Knowledge of CC is good to moderate	Knowledge of CC is limited, uncertain about it	Not knowledgeable about CC	Not knowledgeable about CC
Views close links between subject and CC	Views topical relevance between CC to their subjects	Views superficial links between CC and their subject	Views no relationship between their subject to CC
Positions self as a responsible and active teacher	Positions self as a hesitating teacher	Positions self as a curriculum implementer	Positions self as an overburdened teacher
Supports personal position (worshiper)	Follows school imperatives	Follows national imperatives	CC as separate subjects
Positions a student as an agent			Positions students in a less agentic role

The first teacher environmental identity can be described as a Master Storyteller. Teachers in this category believed climate change was happening and that it was important to integrate teaching about it into the school curriculum. Respondents who constructed this identity expressed their belief that climate change was happening and described how human activities caused it. Their

knowledge about climate change is quite good, some may know it moderately well. They observed the impacts in their community and experienced it themselves. These observations and experiences shaped their beliefs and values regarding climate change education. The respondents also described “multiple links” between climate change, and some might even perceive their subject through the lens of climate change science. They might position themselves as being responsible for and taking a more active role in integrating teaching on climate change through various strategies. Therefore, some might use different teaching methods such as projects and field visits. They also collaborated with other subjects and supported pupils working in groups. Furthermore, a personal position as “worshipper” might add an element of spirituality, suggesting that the respondent perceived climate change as an existential threat, hence supporting this identity. They also positioned their pupils in more agentic role such as an “inquirer”, “problem solver” and “nature conservationist”. This indicated their belief that education could serve as a tool to adapt to climate change and minimize its impacts locally.

The second environmental identity among the teachers can be called an Early Adopter, they also believed that climate change was happening and started to integrate teaching on it into their lessons. Similarly, respondents constructing this identity expressed their belief in climate change yet reported minimal mastery of climate change knowledge and uncertainty about what they knew. They also believed that the relevance of climate change needed to be integrated into their topics. These respondents might perceive limited links between climate change and their topics and might choose selected information on climate change of relevance to their subjects then instruct their pupils on these topics. Their hesitation to teach about climate change might also be related to the level of knowledge about climate change. They might already integrate Education for Sustainable Development into their teaching as part of their school imperatives. This integration might be sporadic and unsystematic, they might refer to climate change issues in their teaching, either through relevant content or by discussing the issues as a prelude to the main content or topic. Thus, based on this experience, they believed that teaching on climate change could be integrated into teaching on other subjects.

The third teacher environmental identity can be described as a Reluctant Implementer. These teachers believed that climate change was happening but did not yet integrate it. Some respondents who constructed this identity might position themselves as “implementers” but as “not knowledgeable” about climate change. They awaited instructions on how and when to integrate climate change into their subjects. Therefore, they also described the need for curriculum change at the national level for that to happen. This indicates their understanding about formal curriculum and their role in the process. Furthermore, they see

a superficial link between climate change and their subjects and mostly used climate change only as anecdotal examples in the classrooms. One respondent described how climate change could be “pasted on their subjects” indicating a narrow perspective on climate change and curriculum, which might suggest that there were greater challenges to integrating Climate Change Education into school.

The last teacher environmental identity can be described as a Discouraged Believer. These teachers believed that climate change was happening, but did not integrate teaching on it into their lessons. These respondents positioned themselves as “not knowledgeable” about climate change and viewed the topic as too complex. They might also think that they perceived no relation to their own subjects. Some respondents might call themselves overburdened in their own teaching, believing that climate change teaching should be a separate subject at school. This position may indicate a strict disciplinary perspective on their own subject coupled with a lack of understanding of climate change that inhibited its integration. Furthermore, the feeling of overwhelm may reflect their reaction to the curriculum in their context. They positioned their pupils as “not aware” of their actions possibly contributing to climate change and needing to be constantly prompted, indicating a less agentic role for their pupils.

Although our study did not identify any explicit expressions of climate change denial among our respondents, we acknowledged the possibility that some positions might align with this belief. However, due to the site of the study – schools actively involved in green projects with heightened awareness of climate and sustainability issues – the respondents may be more inclined to support these initiatives openly. It is also possible that views associated with climate scepticism, if present, were not publicly expressed by participants. This suggests a nuanced landscape where institutional and cultural influences shape how environmental identities are publicly conveyed.

Considering Imagination and Curriculum Constructs in Climate Change Integration

Based on the four constructs described in the previous section, we consider teacher environmental identity as a useful and beneficial construct to be used in investigating and developing climate change education. Using the identity perspective in this study enabled us to gain insights into how climate change integration was being experienced by the teachers in this context. Furthermore, the narrative methodology applied in this study also supported this investigation and provided our respondents with a way to articulate their experiences of climate change education. The teachers’ stories included references to traditional ecological knowledge, spiritual motivation and traditional competence relevant

in their local context. These alternative worldviews may orient the relationship between humankind and nature in a different way.

In the findings, we were able to identify positions reflecting the relational aspects of environmental identity that include somatic, perceptual, emotional, aesthetic, and spiritual aspects (Meijers et al., 2016). For example, a respondent positioned herself as a “worshipper” reflecting the spirituality aspect and serving as an important source of motivation and agency. Furthermore, when respondents position themselves as part of the traditional community with specific practices, they are able to access different anthropocene imaginaries that extend the relationship between human and non-human (Adams, 2020). This is crucial if teachers are encouraged to have narrative imagination in teaching about climate change, the ability that helps teachers to demonstrate critical thought supported by the incorporation of diverse viewpoints (Panjwani & Brown, 2020). Hence, this position may tap into somatic and aesthetic aspects that will enrich their imagination.

The findings also point to possible avenues to support teachers to integrate teaching on climate change by investigating the underlying concept about curriculum that informed their curriculum work. For example, the curriculum integration approach described by participants may be strongly influenced by the concept of “curriculum as prescription” (Goodson, 2009). This approach may limit teachers’ imagination in integrating climate change into their subjects and teaching because of the prescribed way that may position them as implementers. The identity of reluctant implementer and discouraged believer may be associated with this position.

In the study, even when the schools already implemented ESD to varying degrees, respondents still professed unfamiliarity with climate change and expressed reluctance to integrate climate change into their teaching. Stevenson (2007) already hinted at these possible tensions due to divergence between the purpose and practice of schools and environmental education. In this study, additional tensions emerged due to disciplinary boundaries that might lead to low integration of climate change despite positive support at schools as it might challenge the respondents’ identities as subject teachers.

Therefore, there is a need to acknowledge how teachers can be supported to “explore social practices through practical reasoning as the basis of the school curriculum” (Hooley, 2007, p. 51). These practices may be aligned with the “curriculum as complex conversation” approach, where teachers position themselves as curriculum makers (Craig & Ross, 2008; Pinar, 2011). Some of these practices may be associated with the teacher identity as a Master Storyteller and they are maintained through integrated activities and personal knowledge (Salite et. al, 2021). These teachers are able to perceive relevance through various

linkages between climate change and their subjects. Furthermore, they sought relevance in values and practices in the local context from the perspective of climate change adaptation and mitigation. Similarly, in a study conducted by Kitagawa (2023) connection is also a concept used by the respondents of the study to highlight the role of geography in relation to collaboration and local knowledge that is holistic in nature. Finally, these teachers forged connections between pupils' lives and their own, between schools and the community. The identity as a Master Storyteller highlights the holistic and integrative way of looking at knowledge reflecting the holistic/ecological educational paradigm as opposed to mechanistic view on education, learning and pedagogy (Raus & Falkenberg, 2014). While teacher environmental identity as an Early Adopter shows an inclination to integrate climate change, they may require more support to help them gain mastery of these practices.

Conclusion

The four teacher environmental identity constructs described in this study highlight the need to attend to both the personal and professional dimensions of teacher identity in integrating teaching on climate change into education. The findings of this study help us understand more profound challenges in integrating climate change teaching due to the deep-seated curriculum constructs operating in the context. Furthermore, the relational aspects reflected in diverse positioning used by respondents in their narratives also provided a useful framework for teachers navigating the complexity of teaching about climate change.

The environmental identity in this study was constructed on the basis of specific narratives obtained from Indonesian teachers teaching in specific contexts. Thus, the scenarios described may not be generalizable to understanding teachers in other contexts. However, the conceptual and methodological approach applied in this study may be useful to investigate teachers in other contexts. Furthermore, the study also highlights the importance of critical reflection processes that will lead to perspective transformation based on the understanding of teacher environmental identity during learning in teacher education and professional development (Iliško, 2007). Therefore, although climate change integration may look different in different parts of the world, teachers will hopefully be equally supported through targeted in-service education that recognizes and addresses diverse teacher environmental identities.

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References

- Adams, M. (2020). *Anthropocene psychology: Being human in a more-than-human world* (1st ed.). Routledge. <https://doi.org/10.4324/9780203703694>
- Akkerman, S. F., & Meijer, P. C. (2011). A dialogical approach to conceptualizing teacher identity. *Teaching and Teacher Education*, 27(2), 308–319. <https://doi.org/10.1016/j.tate.2010.08.013>
- Almeida, S. C., Moore, D., & Barnes, M. (2018). Teacher identities as key to environmental education for sustainability implementation: A study from Australia. *Australian Journal of Environmental Education*, 34(3), 228–243. <https://doi.org/10.1017/aee.2018.40>
- Alsup, J. (2008). *Teacher identity discourses: Negotiating personal and professional spaces*. <http://choicereviews.org/review/10.5860/CHOICE.43-6016>
- Anderson, A. (2012). Climate change education for mitigation and adaptation. *Journal of Education for Sustainable Development*, 6(2), 191–206. <https://doi.org/10.1177/0973408212475199>
- Anderson, C., & Kirkpatrick, S. (2015). Narrative interviewing. *International Journal of Clinical Pharmacy*, s11096-015-0222–0. <https://doi.org/10.1007/s11096-015-0222-0>
- Bamberg, M. (2010). Master narrative. In D. Herman, M. Jahn, & M.-L. Ryan (Eds.), *Routledge encyclopedia of narrative theory* (Repr.). Routledge.
- Bentz, J. (2020). Learning about climate change in, with and through art. *Climatic Change*, 162(3), 1595–1612. <https://doi.org/10.1007/s10584-020-02804-4>
- Boon, H. (2016). Pre-service teachers and climate change: A stalemate? *Australian Journal of Teacher Education*, 41(4), 39–63. <https://doi.org/10.14221/ajte.2016v41n4.3>
- Cantell, H., Tolppanen, S., Aarnio-Linnanvuori, E., & Lehtonen, A. (2019). Bicycle model on climate change education: Presenting and evaluating a model. *Environmental Education Research*, 25(5), 717–731. <https://doi.org/10.1080/13504622.2019.1570487>
- Craig, C. J. (2007). Story constellations: A narrative approach to contextualizing teachers' knowledge of school reform. *Teaching and Teacher Education*, 23(2), 173–188. <https://doi.org/10.1016/j.tate.2006.04.014>
- Craig, C. J., & Ross, V. (2008). Cultivating the image of teachers as curriculum makers. In F. Connelly, M. He, & J. Phillion, *The SAGE handbook of curriculum and instruction* (pp. 282–305). SAGE Publications, Inc. <https://doi.org/10.4135/9781412976572.n14>
- Dewi, R. P., & Khoirunisa, N. (2018). Middle school students' perception of climate change at Boyolali District, Indonesia. *IOP Conference Series: Earth*

- and Environmental Science*, 200, 012061. <https://doi.org/10.1088/1755-1315/200/1/012061>
- Drewes, A. (2020). Personal, professional, political: An exploration of science teacher identity development for teaching climate change. *Environmental Education Research*, 26(4), 611–612. <https://doi.org/10.1080/13504622.2020.1737647>
- Eilam, E. (2022). Climate change education: The problem with walking away from disciplines. *Studies in Science Education*, 58(2), 231–264. <https://doi.org/10.1080/03057267.2021.2011589>
- Eze, E., Nwagu, E. K. N., & Onuoha, J. C. (2022). Nigerian teachers' self-reported climate science literacy and expressed training needs on climate change concepts: Prospects of job-embedded situative professional development. *Science Education*, 106(6), 1535–1567. <https://doi.org/10.1002/sce.21743>
- Fujii, H. (2022). Trends and perspectives of climate change education in the Asia-Pacific. In W. O. Lee, P. Brown, A. L. Goodwin, & A. Green (Eds.), *International handbook on education development in Asia-Pacific* (pp. 1–17). Springer Nature Singapore. https://doi.org/10.1007/978-981-16-2327-1_96-1
- Goodson, I. (2009). Curriculum, narrative and the social future. In E. Ropo & T. Autio (Eds.), *Curriculum, personal narrative and the social future* (pp. 71–85). Sense Publishers.
- Harris, D. M. (2017). Telling the story of climate change: Geologic imagination, praxis, and policy. *Energy Research & Social Science*, 31, 179–183. <https://doi.org/10.1016/j.erss.2017.05.027>
- Hermans, H. J. M., Konopka, A., & Hermans-Konopka, A. (2010). *Dialogical self theory: Positioning and counter-positioning in a globalizing society* (1st publ.). Cambridge University Press.
- Hooley, N. (2007). Establishing professional identity: Narrative as curriculum for pre-service teacher education. *Australian Journal of Teacher Education*, 32(1), 49–60. <https://doi.org/10.14221/ajte.2007v32n1.4>
- Iliško, D. (2007). Teachers as agents of societal change. *Journal of Teacher Education for Sustainability*, 7, 14–26. <https://doi.org/10.2478/v10099-009-0002-9>
- Izadinia, M. (2013). A review of research on student teachers' professional identity. *British Educational Research Journal*, 39(4), 694–713. <https://doi.org/10.1080/01411926.2012.679614>
- Karami, S., Shobeiri, S. M., Jafari, H., & Jafari, H. (2017). Assessment of knowledge, attitudes, and practices (KAP) towards climate change education (CCE) among lower secondary teachers in Tehran, Iran. *International Journal of Climate Change Strategies and Management*, 9(03), 402–415. <https://doi.org/10.1108/IJCCSM-04-2016-0043>

- Kitagawa, K. (2023). Learning and teaching of climate change, sustainability and disaster risk reduction in teacher education in England and Japan. *Journal of Teacher Education for Sustainability*, 25(2), 5–20. <https://doi.org/10.2478/jtes-2023-0013>
- Leiserowitz, A., Rosenthal, S., Verner, M., Lee, S., Ballew, M., Carman, J., Goldberg, M., Marlon, J., Paramita, E., Chamim, M., Mohammad, P., & Daggett, M. (2023). *Climate change in the Indonesian mind* (p. 40). Yale University.
- Meijers, F., Lengelle, R., & Kopnina, H. (2016). Environmental identity and natural resources: A dialogical learning process. *Resources*, 5(1), 11. <https://doi.org/10.3390/resources5010011>
- Moezzi, M., Janda, K. B., & Rotmann, S. (2017). Using stories, narratives, and storytelling in energy and climate change research. *Energy Research & Social Science*, 31, 1–10. <https://doi.org/10.1016/j.erss.2017.06.034>
- Muttarak, R., & Lutz, W. (2014). Is education a key to reducing vulnerability to natural disasters and hence unavoidable climate change? *Ecology and Society*, 19(1), art42. <https://doi.org/10.5751/ES-06476-190142>
- Nugroho, A. W. (2020). What students know about climate change? A case study of high school students in Samboja, Indonesia. *IOP Conference Series: Earth and Environmental Science*, 487(1), 012001. <https://doi.org/10.1088/1755-1315/487/1/012001>
- Nuridin, N., Rafliana, I., Hidayati, S., Oktari, R. S., & Djalante, R. (2017). Integrating disaster risk reduction and climate change adaptation into school curricula: From national policy to local implementation. In R. Djalante, M. Garschagen, F. Thomalla, & R. Shaw (Eds.), *Disaster risk reduction in Indonesia: Progress, challenges, and issues* (pp. 213–234). Springer International Publishing. https://doi.org/10.1007/978-3-319-54466-3_8
- Panjwani, F., & Brown, N. (2020). Teaching for 3Cs: Centering imagination in teacher education. In K. Nolan & J. Tupper (Eds.), *Social theory for teacher education research: Beyond the technical-rational* (pp. 105–123). Bloomsbury Academic. <https://doi.org/10.5040/9781350086425>
- Pinar, W. F. (2011). *The character of curriculum studies: Bildung, Currere, and the recurring question of the subject* (1st ed.). Palgrave Macmillan.
- Polkinghorne, D. E. (1996). Explorations of narrative identity. *Psychological Inquiry*, 7(4), 363–367. https://doi.org/10.1207/s15327965pli0704_13
- Riessman, C. K. (2008). *Narrative methods for the human sciences*. Sage Publications.
- Raus, R., & Falkenberg, T. (2014). The journey towards a teacher's ecological self: A case study of a student teacher. *Journal of Teacher Education for Sustainability*, 16(2), 103–114. <https://doi.org/10.2478/jtes-2014-0014>
- Rousell, D., & Cutter-Mackenzie-Knowles, A. (2020). A systematic review of

- climate change education: Giving children and young people a 'voice' and a 'hand' in redressing climate change. *Children's Geographies*, 18(2), 191–208. <https://doi.org/10.1080/14733285.2019.1614532>
- Rushton, E. A. C. (2021). Building teacher identity in environmental and sustainability education: The perspectives of preservice secondary school geography teachers. *Sustainability*, 13(9), 5321. <https://doi.org/10.3390/su13095321>
- Salite, I., Fjodorova, I., Butlere, I., & Ivanova, O. (2021). More personal knowledge for more sustainable higher education. *Journal of Teacher Education for Sustainability*, 23(1), 150–165. <https://doi.org/10.2478/jtes-2021-0011>
- Singh, V. (2024). Breaking the paradigm: Storying climate change. In S. Tolbert, M. F. G. Wallace, M. Higgins, & J. Bazzul (Eds.), *Reimagining science education in the Anthropocene, Vol. 2* (pp. 143–160). Springer International Publishing. https://doi.org/10.1007/978-3-031-35430-4_9
- Stets, J. E., & Biga, C. F. (2003). Bringing identity theory into environmental sociology. *Sociological Theory*, 21(4), 398–423. <https://doi.org/10.1046/j.1467-9558.2003.00196.x>
- Stevenson, R. B. (2007). Schooling and environmental education: Contradictions in purpose and practice. *Environmental Education Research*, 13(2), 139–153. <https://doi.org/10.1080/13504620701295726>
- Stevenson, R. B., Nicholls, J., & Whitehouse, H. (2017). What is climate change education? *Curriculum Perspectives*, 37(1), 67–71. <https://doi.org/10.1007/s41297-017-0015-9>
- Tibola Da Rocha, V., Brandli, L. L., & Kalil, R. M. L. (2020). Climate change education in school: Knowledge, behavior, and attitude. *International Journal of Sustainability in Higher Education*, 21(4), 649–670. <https://doi.org/10.1108/IJSHE-11-2019-0341>
- UNESCO. (2021). *Learn for our planet: A global review of how environmental issues are integrated in education*. <https://unesdoc.unesco.org/ark:/48223/pf0000377421>
- Wortham, S. E. F. (2000). Interactional positioning and narrative self-construction. *Narrative Inquiry*, 10(1), 157–184. <https://doi.org/10.1075/ni.10.1.11wor>
- Zen, S. (2023). *Dynamics of Teacher Identity Construction: Indonesian Teachers in Finnish International Teacher Programme* [PhD Thesis]. Tampere University.
- Zen, S., Ropo, E., & Kupila, P. (2021). Teacher Identity under Reconstruction: Positional Analysis of Negotiations in an International Teacher Education Programme. *Australian Journal of Teacher Education*, 46(4).

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