


Climate change education through drama and social learning: Playful inquiry for building extreme weather events adaptation scenarios

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Abstract

Considering the projected impacts of climate change in upcoming decades, innovative educational approaches should encourage inventive problem-solving techniques and societal change, fostering transformative climate adaptation. The value of drama in climate adaptation education remains a novel area in the environmental education research literature and requires further exploration of its potential benefits to Climate Change Education (CCE). This article presents a proposal for CCE to include various elements in a drama workshop by evaluating a methodological framework. Participants in the workshop studied the vulnerabilities that arose from flooding and droughts while dramatizing different social conflicts to develop building adaptation scenarios. Through the exploration of problems via playful activities, participants collaboratively construct narratives and texts rich with meaning, based on a critical and creative perception of themes, needs, desires, and overlapping ideologies. This short-term experience manifests efficacy in elucidating the underpinnings of social systems structures, human values, and motivations. This article analyzes workshop results, providing a pedagogical structure and theoretical foundation, contributing to a better comprehension of drama in education and the creation of capacities towards CCE.

Keywords

Climate change education, drama in education, extreme weather events, resilience, mitigation, arts-based research, social learning

Introduction

The human and environmental risks from extreme weather events are significant and increasing as climate change affects the frequency and severity of these events (IPCC, 2019; Ripple et al., 2022). Given the severe and irreversible impacts expected from climate change in the coming decades, new approaches to education and training are needed to promote creative problem-solving and social transformation that include awareness-raising leading towards mitigating actions. Despite a scientific consensus on the anthropogenic causes of climate change, the perception of the problem is still conflicting. If, on one hand, climate change is perceived as abstract, distant, and conflicting (Weber, 2016), on the other hand, through integrative science, it is perceived through an interconnected lens focussing on the multiple processes of environmental, economic, political, and cultural change, which are intricately linked to norms, beliefs, values, as well as individual and shared worldviews. When questioning paradigms and emphasizing relationships, participation, empowerment, and self-organization, we can create space for new ways of exploring the complexities of climate change (Leichenko & O'Brien, 2020; Bentz, 2020).

According to Weber (2016), scientific accuracy is only one of many perception factors, and it is often dimmed by the expression of ideological thinking in the face of a massive problem with no obvious solution. A wide range of structural, psychological, social, and

cultural factors can alter climate change perception (Weber, 2016; Gifford, 2011). The existing disagreement results from the influence of cultural cognition and group values on the individuals' perceptions (Kahan et al., 2011). For Kahan et al. (2011), cultural cognition refers to an individuals' tendency to adjust their perceptions of risk and factual beliefs to their shared moral assessments. In the face of diverging perceptions, however, the complex problem of climate change becomes highly challenging. In this context, there is a growing recognition that education needs to change to deal with the complexity of teaching climate change (Bentz, 2020).

Traditional educational approaches to climate change, as practiced in geography or sciences, for example, tends to focus on the greenhouse gas effect and potential consequences of rising temperatures, changes in precipitation patterns, and rising sea levels, which result in increasing feelings of sadness, hopelessness, and anxiety. (Bentz, 2020; Jónsdóttir, 2017). Many educators still focus on the technical dissemination of scientific information or other restricted disciplinary paradigms, which neglect more constructive and creative ways of understanding the world (Jacobson et al., 2016). Leichenko and O'Brien (2020) assess that current education on climate change (CCE) is narrow and linear. In other words, courses and curricular interventions on climate change mainly emphasize scientific literacy on physical processes of increased emissions and empirical evidence of a changing climate. As a result, students find it challenging to recognize the social, psychological, and emotional dimensions of the issue and often fail to see the openings, possibilities, and entry points for active involvement in the transformations for sustainability (Leichenko & O'Brien, 2020). A purely technical educational approach to climate change often fails to capture the complexity of the factors that affect vulnerability or influence individual and collective human behaviours (Leichenko & O'Brien, 2020). Current analytical, reductionist, and encapsulated educational approaches within the different disciplines need to be transformed through alternative ways of learning that reconcile and integrate diverse and holistic knowledges to tackle better complexity, uncertainty, and contested knowledge, required in the process of understanding and acting on the problem of climate change (Jónsdóttir, 2017). In this context, the ecological crisis might also be an opportunity to change education at all levels, helping to create agents who can identify opportunities to confront climate change (O'Sullivan, 1999; Bonatti et al., 2016).

In this context, CCE is a sensitive and complex educational process integrating different fields and disciplines (Pruneau et al., 2010). The educational objectives are equally ambitious: helping citizens to understand complex environmental and meteorological concepts, changing their daily lifestyle, and adapting to a phenomenon that causes unpredictable impacts (Pruneau et al., 2010). The educational sector is crucial in addressing climate change because educational institutions are spaces where systematic strategies and thinking and alternative futures are created (Drewes et al. (2017)).

For Bentz and O'Brien (2019), the complexity of climate change requires innovative, radical, and creative approaches to education. Bruno Latour (2004, p. 30 in Bentz & O'Brien, 2019) suggests that climate change is a 'collective experiment' that invites us to look beyond and to work across the traditionally defined boundaries between science and arts and between laboratory and gallery to address the complexities of the social, political,

economic, and environmental contexts of climate change. That implies changing the traditional sender-receiver paradigm in scientific, creative, and educational processes and moving to knowledge co-production, integrating experience, dialogue, and reflection in the process of social learning (Bonatti et al., 2022; Collins, K., & Ison, 2009; Cundill & Rodela, 2012). Rousell and Cutter-Mackenzie-Knowles (2020) suggest that education for climate change needs to be participatory and based on creative approaches from various disciplines to establish itself as distinct from scientific education and environmental education. The scientific, social, ethical, and political complexities of climate change require such an approach, which enables individuals and communities to become meaningfully involved with the entanglement of facts, values, power relations, and climate concerns at multiple scales and timeframes (Bonatti et al., 2016). That requires climate change education that is open to radical and visionary alternatives for the future, necessarily based on practices associated with environmental activism, social and political intervention, digital innovation, citizen science, and creative arts, among others (Rousell & Cutter-Mackenzie-Knowles, 2020).

Jacobson et al. (2016) suggest that a greater alliance with artists and integration with artistic education could help catalyse scientific innovation by improving associative and divergent thinking in students to complement systematic reasoning processes. Trans-disciplinary engagements need various methods, perspectives, and approaches in designing actions to advance our understanding of adaptation processes based on learning (Jónsdóttir, 2017; Rousell & Cutter-Mackenzie-Knowles's (2020)).

Several studies have also shown that cooperative, interdisciplinary, participatory, location-based, and experiential learning programs have significantly impacted the attitudes and actions of children and young people towards climate change (Rousell & Cutter-Mackenzie-Knowles, 2020). Figure 1 shows different perceptions and approaches toward climate change.

Although there are discussions on the contribution of art to addressing climate change, it remains an underutilized potential (Bentz, 2020). Art in climate change curricula and praxis is still rarely mentioned in current examples of interdisciplinary education found on popular internet sites (Jacobson et al., 2016). Despite the growing attention to the potential of art tackling climate change, there is still a gap in translating the method into practical application that needs to be filled.

Playful inquiry through drama

Drama is a methodology for structuring an art experience in education during which participants build a narrative in action by the means of improvisation and other theatre games (O'Neill, 1995). Drama uses, produces, and experiments with a variety of narrative possibilities, thus recalling the contributions of the great storytellers of the 20th century (Somers, 2008; Taylor & Warner, 2006).

Making sense of an experience through imagination and representation has always been a fundamental human cultural expression. We use many dramatizations in our daily life, we think and imagine dramatically, without even realizing it (Courtney, 1989). Drama and theatre are at the base of all primitive education as a way of testing or simulating the

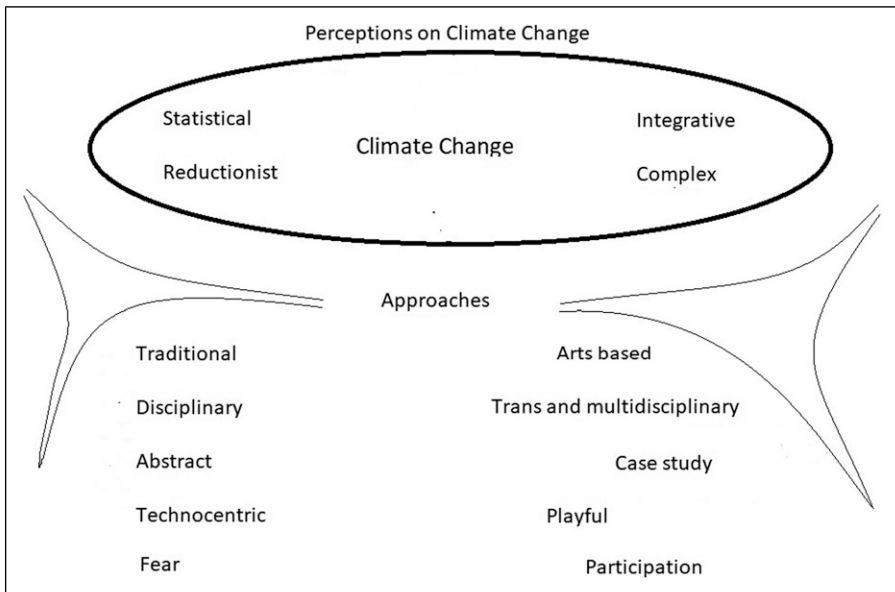


Figure 1. Climate change perceptions and approaches. Source: Own.

affairs of life. Throughout human existence, theatre has been a way to experiment and plan undertakings to be later executed. Therefore, the dramatic process is vital for humans. The creative imagination, an essential characteristic of humans, is dramatic (Courtney, 1989).

Dance and theatre, as particularly embodied practices, can incorporate played narratives. When we understand the body as having meaning, we can use it as a means of asking questions, connecting with emotions, and understanding concepts. In this way, the arts of the body can challenge embodied and invisible norms and experience different ways, exercising their transcendent and transformative potential (Bentz, 2020).

Building on these ideas, our paper discusses the outcomes of an experiential educational process with the aim to generate critical awareness among the participants. As part of the research process, we have conducted a pedagogical workshop and designed a specific teaching and learning methodological framework based on Drama. We have created a playful inquiry framework on vulnerability and resilience, using the tool of drama in education, applied to the challenges that come with extreme weather events such as floods and droughts.

We acknowledge Augusto Boal's idea that action in theatre can help change reality, which means that there should be no spectators but rather everybody becomes an involved actor (Boal, 2019). How education on climate change will foster transforming attitudes and visions of the future? To contribute to answering this question, we hypothesize that drama engages participants by combining play, narrative, and research. In our workshop, we aimed this playful inquiry on CC with solutions to increase resilience and mitigation.

Focussing on drama in education as a teaching method in the context of the CCE, we selected the following three research questions: (a) Is drama an engaging method for CCE? (b) What are the required contexts and key foundations in its application? (c) How can they be operationalized in practical educational experiences?

This article seeks to find the ideal conditions under which teachers can carry out CCE, involving playful research and educational practice, combining different disciplines, and facing concrete challenges such as extreme weather events. Therefore, our objective is to provide a theoretical and operational framework for designing CCE proposals through drama. By reflecting on our practice and reporting about our study, we address concerns regarding how to plan a playful research practice and a group teaching-learning project with the purpose of building extreme weather resilience capacities.

Methodology

Workshop setting, materials, and facilitators

The workshop was held by the first and second authors in Asunción, Paraguay, within the SINERGIA project, during the ADAPTCLIM event. The workshop was conducted in a conference room in the hotel that held the event in Asunción, lasted for 4 hours and focused on the collective construction of strategies for climate adaptation.

While the event was generally aimed at civil society, the workshop audience comprised university professors, researchers, university students, and NGO leaders ($n = 24$), men and women ranging from 22 to 60 years of age. Even though all of them were interested in climate change, participants were randomly selected just before the workshop started amongst the event participants interested. They came from different ethnic and racial backgrounds and from different countries in Europe and South America. The workshop participants include diverse disciplines, professional areas, and ages to test the method's effectiveness concerning acceptability and interdisciplinary.

The first and second writers were the facilitators of the workshop. The first writer is a professor in theatre and drama in education. The second writer is agronomist and researcher.

Data collection, ethics and exploratory analysis of the workshop data

The observation of behaviour, comments and body language of participants in a deliberative setting by a facilitator is critical for experiential social learning workshops as it allows the capture of qualitative information on the interactions taking place during workshops (Bentley Brymer et al., 2018; Leclercq et al., 2023). One of the last activities consisted of asking participants about their workshop experience. This was a space to criticize the workshop, considering generating a space for learners to take charge of their own learning and influence the results description, in line with the experiential social learning theory (Kolb & Kolb, 2009) and foster the conscientization process (Freire, 2018).

The outcomes of the workshop, collected through facilitators' notes, photos, take-home questions and answers, were analysed in a descriptive manner by one of the researchers who facilitated the workshop and the interdisciplinary research team integrated by the other researchers who had facilitated the workshop. All the participants signed a term of consent. The workshop structure and ethical procedures were reviewed and approved by the Claris LPB and Sinergia projects coordinators.

Regarding managing the potential distress of participants, the workshop facilitators focused on possible neutrality, keeping discussions focused on the workshop topics, and handling any personal issues discreetly and separately if they begin to affect the workshop environment or dynamics.

The proposed method based on 'Compound Stimulus' focuses on considering the participants' mental models, knowledge and views on how to conduct climate adaptation. By implementing a role play it avoid specific personal and individual stories. However, in this method an observer role was also established.

Regarding the single application, the purpose of analysing these outcomes is purely exploratory and aims at generating a framework for guiding the implementation of arts in climate education. The intention of the authors is to gain more insight into the possible future use of climate change education workshops as a tool which might: (a) facilitate the communication and mutual trust among different actors involved in risk assessment, management and communication and (b) achieve social learning on scientific topics that might involve sensitive aspects from both a personal and trigger unintended emotional resistance (Leclercq et al., 2023).

The theoretical framing for analysis is based on the occurrences of the elements presented in the [Figure 2](#) during the workshops. [Figure 2](#) presents key processes in arts-based learning and drama which support our discussion.

Workshop planning, structure and process

The first objective of the workshop was to engage participants in an art experience. We decided to create a situation in which participants 'care about' the story and the people within it. Artefacts have story-generating potential. A tool can suggest labour and the labourer. As Somers (2008) points out, a picture of a baby does not generate 'any stories other than simplistic ones based on the concept of "baby." Add the sound of a metronome to the image and a new impetus for story making is generated'.

An individual artefact has limited potential in suggesting a narrative. The approach called Compound Stimulus engages participants by giving them ownership of an embryonic narrative; the generation of a pre-story while exploring artistically a certain combination of objects that generates a fictional issue (Somers, 2008). Compound Stimulus is a way of building a pre-text with a set of artefacts (objects, photographs, letters, documents, etc.), as Somers (2008) defines it.

We build Compound Stimulus by selecting different objects that together will suggest a narrative. Participants should investigate the artefacts and complete the story through dramatic action. Therefore, planning drama using Compound Stimulus requires elaborating a set of objects based on a situation. When explored through drama, the artefacts can lead their explorers to compose a narrative. Participants give meaning to the artefacts

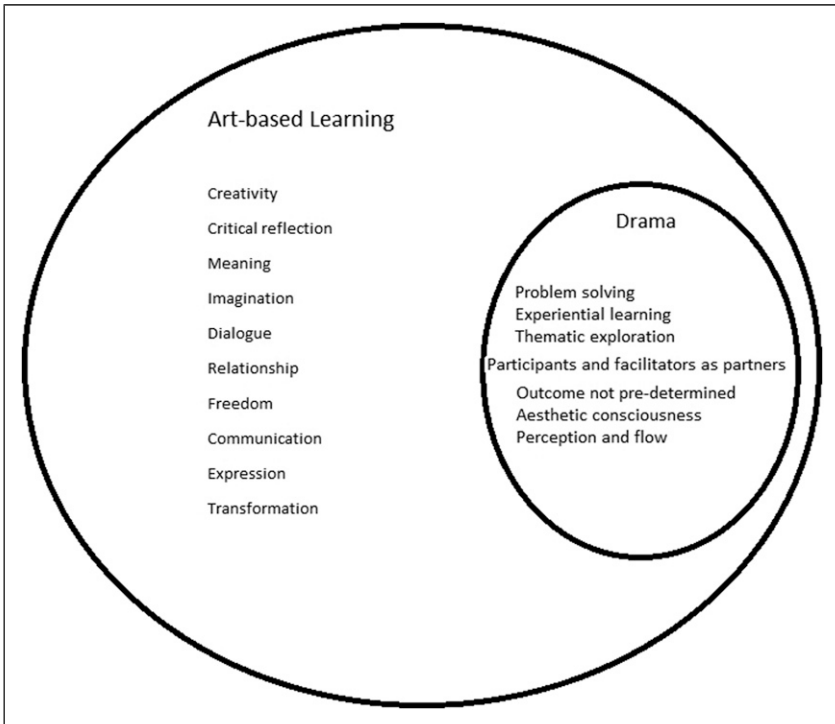


Figure 2. Arts-based learning and drama key elements for CCE: analytical framework. Source: Own.

by juxtaposing them. When put together, they suggest human action and motivation (Somers, 2008).

We have created two different sets of objects and two different containers, one related to flood, and the other related to drought. The wooden box contained two family photos, a notebook, an umbrella, a civil defence notice advising people at risk to leave their homes because of an imminent risk of a hillside collapsing due to the rain, a medical thermometer, a package of a half-filled stuffed wafer, silicone gloves, a sanitary surveillance brochure with information on what to do in the event of flooding, and a water-damaged letter packaged in a plastic bag. In the damaged letter, it is possible to identify that a mother is responding to her daughter.

“My dear daughter,

I am so sorry for everything that is going on. It was so unfortunate! Remember everything we’ve already suffered. Look at everything we’ve learned! We are proud of you, so alive and fighting, you are so strong!

Don’t worry much about the things you’ve lost and forgive your neighbors. Why don’t you present yourself to them, even give them a gift, like the beautiful bread you can bake?

Oh, darling, I miss you! I wish I could be helping with the children. If you change your mind and decide to come back, we can try to arrange a place for you to stay while you look for work. Dad is missing all of you. He says that you should return.

I am praying that God guides and protects you.

Your mother, who loves you so much.”

The cardboard box contained a cloth bag with seeds, an empty water bottle, a used bus ticket, a photo of a dry eroded creek next to a cistern and a silo, as well as an official letter from the association of agroecological producers on a meeting with the objective of starting a project for the construction of cisterns. It also contained a bag with a few transparent plastic bags containing different medicinal herbs, plus a note mentioning that they are getting together in celebration for the painting of the rural school that was going to happen on Saturday, and a pamphlet from the Ministry of Agrarian Development – MAD – convening a meeting to organize emergency technical assistance due to the long dry season.

As shown in the [Table 1](#) and detailed in the text below, the workshop structure was composed of six steps.

Table 1. Workshop structure.

Episode	Focus/objective	Methodology overview	Key results targeted related to the analytical framework. (Figure 2)
A	Presenting the scenarios (launching the pre-text)	Step 1: Introduction	Dialogue, critical reflection, communication
		Step 2: Warm-up	Dialogue, creativity, presence, perception and flow
		Step 3: Launching the pre-text	Dialogue, imagination, thematic exploration, presence, creativity, perception and flow
		Step 4: Image-theatre	Dialogue, imagination, communication, problem solving; experiential learning, creativity, presence, perception and flow, participants and facilitators as partners, outcome not predetermined
		Step 5: Improvisation game and forum-theatre	Dialogue, imagination, problem solving, communication; critical thinking; experiential learning, presence, creativity, perception and flow, participants and facilitators as partners, outcome not predetermined
		Step 6: Discussion and evaluation	Dialogue, critical reflection, thematic exploration, meaning, aesthetic consciousness

Step 1 – Introduction. We focused on the participants engaged in research on vulnerability and resilience in relation to two different extreme climatic events, a flood, and a drought. We set up the room with chairs placed in a circle. We opened the workshop with a brief introduction on the topics of extreme weather events and vulnerability in the Brazilian context.

Step 2 – Warm up. To familiarize participants, we played three games. The first was a name game. The second consisted of successive rounds of group divisions based on categories like profession, place of birth, place of living, gender, age, and ethnic-racial identity. The third game emphasized the practical challenges of communication in group work. We divided the whole group into two teams facing each other, divided by a screen. Team A had the letter F composed of the seven geometric pieces of the tangram game (Ronald, 2015). The goal for team A was to instruct Team B to build the same figure through the indication of geometric tangram pieces available, not by mentioning the image of the letter F. Team B had the same seven tangram pieces placed randomly.

Step 3 – Launching the pre-text. We changed the focus and tone of the workshop. With a formal posture, we presented two different boxes containing evidence from two cases comprising real events to be investigated and solved by the group (Somers, 2008). We pretended that we found two boxes, one wooden and one cardboard, in places where extreme weather events have happened. There were things inside that would help us find out to whom the boxes belonged and what had happened to them.

We separated the two groups and asked them to investigate the boxes. First, each participant carefully studied the objects from the box then presented them to their group. At the end of the presentation of objects, we compiled all objects and the group naturally talked about who the people were and what possibly might have happened to them; their ideas were written down on provided paper.

Step 4 – Image-theatre. We asked the two groups to create a human picture, a still image of what they learnt from the objects. We explained that they could represent the situation using their bodies to create a moment that would be sustained in a still image. After each image presentation, we asked the other group to interpret the presentation.

Step 5 – Improvisation game and forum-theatre. We asked the two groups to present, in the form of a play, an improvised scene of one situation that could be extracted from the investigation of the items.

Step 6 – Discussion and evaluation. We evaluated the scenes, asking the participants about the performed contexts and solutions according to the given problems. In the final moment, participants were encouraged to look at the workshop critically, then they were asked to evaluate the methods, outcomes, and contents and to provide suggestions. We also asked if they could foresee possible applications of this method in other contexts. The key theoretical and methodological concepts underlying the workshop were also outlined.

Results and discussion

The elements in the art-based learning and drama analytical framework in Picture 4 were the following: creativity, critical reflection, meaning, imagination, dialogue, relationship, freedom, communication, expression, transformation, problem solving, experiential learning, thematic exploration, participants and facilitator as partners, outcome not predetermined, aesthetic consciousness, perception and flow.

One practitioner in character solemnly presented the circumstances in which the boxes were found, in step 3. He asked for help to investigate the situations and understand the cases. Participants revealed the objects and made comments on possible relations between them and what had happened to the owners. It was possible to observe that participants researched the boxes curiously. Participants created a still image with their bodies to represent the situation, the image theatre provided an opportunity to use their bodies to express their ideas.

The reading by the other group of each image allowed participants to take part in each other cases. Spectators proposed questions and new perspectives in the evaluation of each image.

Each group used the previous experience to create an improvisation scene about one situation they have extracted from their research. Practitioners guided the players to plan the improvisation by deciding where they were, who they were, and what was happening to them. Participants were advised not to define too much to allow them to flow with improvisation (Spolin, 1963). One group presented the scene to the other. We evaluated the audience and performers. With the evaluation in mind, the groups returned to improve their communication with the audience. We developed it according to the rule that any audience member could say 'Stop!' causing the performers to freeze at that moment, as in the forum theatre (Boal, 2002). The first audience member was going to propose one idea orally. We guided him to work with the actors and perform it instead. The practitioner and the other players helped him to enter the scene, replacing the original actor, implementing the idea, and leaving the other characters free to interact and respond to it through improvisation. All participants were playfully aware that each new choice generated a reaction from the other characters in the scene. Participants made sense of social, political, and aesthetic dimensions of the experience in the different evaluation moments.

Insights by specific research question (a) Is drama an engaging method for CCE?

The planning involved learning and translating the research into materiality that would allow participants to create the stories. It was a new experience for the researchers. Even though experts in specific fields, none had crossed the disciplinary bounds that way. The project allowed the agronomist to experience theatre research about climate change and the drama teacher to connect its playful inquiry towards climate change.

In the workshop, drama transformed the abstract problem of climate change into a concrete representation of people experiencing extreme climatic events, using a variety of games as a means of researching a problem and proposing creative solutions. While participating in the workshop, participants considered resiliency and hazards from

multiple perspectives. We worked on deepening knowledge and choices, reflecting on the alternatives and variables.

The drama facilitators offered proposals and tasks that allow participants to have an artistic experience related to a predefined significant problem. The drama focused on the process rather than the result presented to an audience. In the process, facilitators and participants worked in partnership as co-artists (Taylor, 1995). In drama, it is not the teachers who know the subject best, but they are rather engaged in structuring a significant learning experience. The teacher's role is to create an environment where deeply involved play can occur (Heathcote & Johnson, 1984).

Drama challenged participants to expand their understanding of themselves and the world around them (Taylor, 1995). For Dewey (in McLean, 1996), learning aesthetically only exists if learners produce knowledge. In process drama, climate change becomes an experience to be approached through a dynamic and varied artistic process using the senses, thoughts, and emotions. Through playful activities to explore the problems, participants collectively build narratives and texts full of meanings according to a critical and creative perception of the theme, needs, desires, and overlapping ideologies.

Reflecting on the impacts of the climate in everyday situations created by the participants opened space for the emergence of other themes, like territory occupation, migration, family, economy, and socio-ecological innovations developed by community members. The audience commented on what they understood, the meanings of the presentation concerning the complex entanglement of processes that one must deal with when facing extreme weather events, such as losing their material belongings in a flood or having to deal with the lack of food and water due to a severe drought.

Siegner & Stapert (2020) report that (1) students who receive the humanities-focused climate curriculum exhibit academic gains in reading comprehension and enthusiasm for curriculum content; (2) the focus of action/solutions can be strengthened by better incorporation of climate action projects authentic and meaningful in the local community; (3) a curriculum centred on the humanities is a promising way to involve students in climate education in a way that promotes dialogue with friends and family (Siegner & Stapert, 2020).

For Pruneau et al. (2010), facing climate change as a complex set of problems can also prevent certain citizens from learning. In addition, some current impacts of climate change are not obvious, either because they are hidden (decreased water levels in the aquifer), invisible (accumulation of pollutants such as non-neoplastic in groundwater and coastal areas), or because they occur in remote areas, where we still know little about the environment and possible consequences (melting of permafrost in the Arctic). Being unable to perceive problems directly through the senses restricts awareness and, therefore, the experiential learning of climate change. Capturing this information requires abstract thinking and weaker transpositions than the signals emitted by the senses (Pruneau et al., 2010). Finally, achieving a mental representation of the impacts of climate change can be challenging since these impacts, particularly extreme events, do not resemble the events experienced by most people (Pruneau et al., 2010). This increasing quality and

granularity of climate data has also brought to our attention social justice issues, as we can expect climate change to worldwide impact more severely indigenous peoples and children, who generally have a relatively low ecological footprint (Rousell & Cutter-Mackenzie-Knowles, 2020).

(b) what are the required contexts and key foundations in its application? c) how can they be operationalized in practical educational experiences?

Drama requires careful planning, which includes a stimulating problem for the participants to work with. With the experience of conducting a workshop, we were able to propose the key elements from drama as a path to facilitate the development of climate change adaptation strategies: play and narrative.

Play. Like other animals, humans play naturally. Many studies about play show that it is an important dimension in the field of culture, education, and arts. The variety, complexity, and possibilities of play are remarkable. For Huizinga (1970), play is the foundation of culture. Huizinga (1970) views that culture arises in the form of play. According to Caillois (2001), play combines limits, convention, freedom, and invention. It also blends dimensions like luck, skill, intelligence, ability, fortune, fun, and enthusiasm.

Playing challenges and generates energy in the players (Heathcote & Johnson, 1984). Dewey (1934, in Dennis, 1970) notes that children are absorbed while playing. As they grow, the activity of play diminishes. However, it should be maintained to keep playfulness, a mental attitude that enables us to live fully in the present and to draw satisfaction from an immediate intellectual development of a topic, irrespective of any ulterior motive (Dennis, 1970).

Narrative. We experience and understand much of the world through narrative. Through stories, it is possible to create meanings and give meaning to our lives. Identity is about knowing who we and the others are. We build and share beliefs through narratives. We shape our identity similarly to the way we create art. Novitz (1989) notes that we use elements from ourselves and the outside, editing it into a sort of coherent piece. Narratives are a primary act of the mind, transferring from life to art, thus creating and controlling experiences, as pointed out by Hardy (1977). Rosen (1986) affirms the centrality of storytelling as providing meaning to people's lives. Therefore, we can use narratives for learning. Through them, we can feel connected, open our eyes to new perspectives, stimulate self-awareness or social reflection (Bentz, 2020).

A story is explored through the pre-text throughout the several stages that make up each episode. Each episode focusses on a dimension of the problem or the context in which the problem occurs. Since it is a framework for structuring drama, pre-text is a key element of the method. The pre-text triggers and engages dramatic explorations. Pre-text is an articulating axis of the web of meanings provided by drama, according to O'Neill (1995). The pre-text provides the possibility of dividing the drama process

Table 2. Overview of Different Episodes Exploring the Pre-text in the Workshops.

Episode	Focus/objective	Methodology overview	Key results to the analytical framework (Figure 2)
B	Community	Step 1: Talk about pre-text and dramatic explorations performed	Dialogue, critical reflection, communication
		Step 2: Free improvisation among community members, what they think and how they decide their lives in a chorus of regrets and planning	Dialogue, critical reflection, thematic exploration, experiential learning; problem solving; presence, creativity, perception and flow, participants and facilitators as partners, outcome not predetermined
		Step 3: Scenario of the diaspora defining before departure what single object each character would choose to take. How was the arrival in the new land, as well as their preparation and adaptation?	Dialogue, imagination, thematic exploration, presence, creativity, perception and flow
		Step 4: Improvisation of those who remained: What did those who did not leave do to resist and overcome their vulnerabilities?	Dialogue, imagination, problem solving; experiential learning presence, creativity, perception and flow
		Step 5: Scene evaluation and presentation of the revised, improved, scenes	Dialogue, communication, critical thinking; experiential learning, presence, creativity, perception and flow
		Step 6: Evaluation of narrative production and meeting	Dialogue, critical reflection, thematic exploration, meaning, aesthetic consciousness
C	Characters	Step 1: Retrieve the pre-text	Dialogue, critical reflection, communication
		Step 2: Interview the characters (hot seating)	Dialogue, critical reflection, thematic exploration, experiential learning, problem solving, presence, creativity, perception and flow, participants and facilitators as partners, outcome not pre-determined
		Step 3: Group decides on two characters to lead to a scenario of dreams entering their unconscious	Dialogue, imagination, thematic exploration, presence, creativity, perception and flow, participants and facilitators as partners
		Step 4: Evaluation of the scenes and presentation with the suggested modifications	Dialogue, imagination, problem solving, experiential learning, presence, creativity, perception and flow, participants and facilitators as partners
		Step 5: Evaluation of the data produced	Dialogue, communication, critical thinking, presence, perception and flow
		Step 6: Evaluation of the conduction of the meeting	Dialogue, critical reflection; meaning, aesthetic consciousness

(continued)

Table 2. (continued)

Episode	Focus/objective	Methodology overview	Key results to the analytical framework (Figure 2)
D	Timeline and history	<p>Step 1: Improvisation of those who have stood to resist and, in the face of exacerbated uncertainty, decided to write reports and diaries. Some fragments are selected and buried to be found in posterity</p> <p>Step 2: The group is facing the situation about one hundred years after the event, with researchers looking for elements to tell this story, but only one dance and one song remained without many other details. Each group does a dance with a song about what happened</p> <p>Steps 3 and 4: Present the presentations and evaluations as well as subsequent presentations, respectively</p> <p>Step 5: Intended for building a timeline to understand the chronology of events</p> <p>Step 6: Dedicated to the production of dramatic exploration</p> <p>Step 7: Evaluation of the process as a whole and the possibility of reworking this exploration in different contexts</p>	<p>Dialogue, imagination thematic exploration, presence, creativity, perception and flow, participants and facilitators as partners</p> <p>Dialogue, imagination, critical reflection, thematic exploration, experiential learning; problem solving; presence, creativity, perception and flow, participants and facilitators as partners, outcome not pre-determined</p> <p>Step 3: Dialogue, imagination; thematic exploration; presence, creativity, perception and flow, outcome not pre-determined</p> <p>Step 4: Imagination, problem solving; experiential learning; presence, creativity; perception and flow, outcome not pre-determined</p> <p>Dialogue, imagination, communication, critical thinking, experiential learning, presence, creativity, perception and flow</p> <p>Dialogue, communication, critical thinking, experiential learning, presence, creativity, perception and flow</p> <p>Dialogue, critical reflection, presence, perception and flow, thematic exploration, meaning, aesthetic consciousness</p>

into episodes. Within each episode, the pretext can always be retrieved, thus allowing new perspectives or new dimensions to be explored. The drama process described corresponds to episode A in which the participants get to know the pre-text and perform initial dramatic explorations. A pre-text can be expanded and deepened in a sequence of episodes according to the time frame. We show (Table 2) the structure of the following workshops as an example of how the pre-text could be developed in other episodes.

Conclusion

The contribution of the arts, specifically drama education for Climate adaptation, is still an emerging field in the literature on environmental education research, deserving a deeper

examination of what it can bring to CCE through an exploration of both its theoretical foundations and current pedagogical practices. In this study, we find drama an engaging method for CCE as we proposed looking at resilience related to extreme weather events such as floods and drought. Drama as a playful method could foster a positive attitude towards the future. The workshop created concrete simulations of drought, flood, and climate-related problems, such as disease and food insecurity. As an exploratory workshop, this experience provides an organized methodological framework that can be reproduced and adapted. This short-term experience manifests efficacy in elucidating the underpinnings of social systems structures, human values, and motivations.

As exemplified by the operationalization of the workshop, the practical exploration of drama key elements play and narrative could foster a deeper understanding of the climate change impacts and of the creation of adaptation strategies. A pedagogy based on drama in education involving art and science seems to elevate awareness about climate change as participants find new possibilities by facing gradual and successive challenges to their perspectives and consciences. In drama, participants use their knowledge critically and creatively to explore an issue and find solutions that lead to new understandings. Through simulated scenarios, participants integrate individual and collective understandings of subjects, contextualize and empathize with people who underwent extreme situations that resulted in vulnerability. By negotiating a collective synthesis of research, learning is more likely to have significant impact and facilitate adaptive change. Discovering contextual factors, developing critical capacities, and creating strategies compatible with the community system are three crucial elements for generating climate adaptation strategies through educational processes. The realities of climate change, already experienced and predicted for the future, make teaching about the causes, consequences, and solutions for climate change an imperative for public and private education (Leichenko & O'Brien, 2020). On the other hand, education on climate change should not be limited to formal education since most people will be involved in climate change outside the traditional classroom (Rousell & Cutter-Mackenzie-Knowles, 2020).

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