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Climate education through online narrative games: the importance of innovation, integration, interaction and intervention

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Abstract

There is growing attention to the role of narrative in climate change education and communication. Storytelling is accessible and engaging, and can generate climate conversations. This study reports on an online narrative video game (Game Changers) designed to generate conversations on topics related to climate change using the convergence of live theatre and games using a novel 'choose *our* own adventure' mechanic. Drawing on analysis of observations of two livestream broadcasts, online chat comments from 128 players and a post-game questionnaire completed by 42 players, we identify four design features that produced climate education-related behaviours. Intervention through choices in the game world enabled agency and the exploration of different futures. Integration of climate change in the plot, characters and scenery enabled an aesthetic experience, critique of corporate power and learning about related concepts such as greenwashing. Interaction between peers and with characters enabled social pleasure through play, climate conversations and learning. Innovation in format, technology and storytelling engaged audiences positively with climate change. Future live game experiences might build bridges between the game world and real world by holding more extended spaces for players to negotiate decisions, and drawing on the expertise of climate activists to strengthen improvisational moments.

Introduction

The climate emergency requires a rapid reduction in greenhouse gas emissions to secure a planet viable for human habitation. The planetary boundary for climate change has already been transgressed, and large, irreversible changes are becoming unavoidable (Richardson et al., 2023). Social movements have increased public awareness, and helped accelerate political commitment and global action on climate change (IPCC, 2023). However activism is a contested term (Peterson et al., 2020), with tensions within and between social movements and broader society around what types of action are most appropriate and effective, and an increasingly obstructed civic space where legal and practical constraints have been placed on rights to protest (Civicus, 2024). Discussions about different forms of climate action are also at risk in schools and other educational institutions where 'petro-pedagogies' legitimise and reinforce beliefs and practices that align with fossil fuel interests (Eaton and Day, 2019; Tannock, 2020; Dunlop et al., 2020). It is therefore essential to make space to explore the links between capitalism and climate change and climate activism outside formal educational spaces. This study examines the use of online game spaces for these explorations.

Under Article 12 of the Paris Agreement, the UN Framework Convention on Climate Change aims to empower all members of society to engage in climate action, including through education. 'Action for climate empowerment' is a framework to describe the role individuals, communities and societies play in tackling climate change (UNFCCC, n.d.). One under-explored space for climate education and communication on these topics is the online game space (Abraham & Jayemanne, 2017). Games are a means by which players can develop an understanding of climate change through active engagement, knowledge construction (Ouariachi et al., 2019), emotional engagement, simulated decision-making and envisioning consequences over time (Wu & Lee, 2015). Games also allow players to explore taking different stances on issues and to explore being a different person, acting in ways they would not in the real world.

The present paper reports on the design and broadcast of an online live-action narrative game converging live theatre and gaming, where players collectively interact with the characters in a climate action collective and decide what happens in the story (Megaverse, 2025). A narrative game can be described as a type of playable story or a game in which characters inhabit a world, act to reach certain goals, and which follows a story (Dubbelman, 2016). There are increasing calls for the use of narrative storytelling in climate communication, beyond being a 'communicative handmaiden to science' to reframe the idea of climate change. This means including the social dimensions (Ahmadov et al., 2024), creating and cohering collective identities and responses to climate change in terms of beliefs and behaviours (Dillon & Craig, 2022). This facility of stories, argue Dillon and Craig, facilitates anticipatory decision-making and influences how evidence is heard and understood.

Innovations in climate change games have included a 'choose your own adventure' mechanic (Muradova & Beauvais, 2025), but we have not encountered online games with a 'choose *our* own adventure' mechanic. Muradova and Beauvais (2025) called for studies that allow players to play the role of a hero who can change the course of history in a game. Our use of a 'choose *our* own adventure' mechanic which foregrounds collective decision-making and action allows players to collectively be heroes and make a positive impact on the story.

The aim of Game Changers was to engage an audience of game players with near future climate change effects in a coastal city, and provide a stimulus for discussing different forms of climate action. Research evidence from the IPCC sixth assessment reports (IPCC, 2021; 2022; 2023), and peer-reviewed studies including empirical research with climate activists (Dunlop et al., 2024) informed the environment, plot and character development, showing the causes (e.g. fossil fuel consumption) and impacts (e.g. flooding, migration, ill health) of climate change, as well as responses (spongy cities, transition to renewables, low consumption cultures, civic, political and extra-political action) and how the fossil fuel industry acts against climate action. Consistent with Mensah-Bonsu et al. (2023), the idea was to explore realistically optimistic visions of the future through the use of game mechanics and content to build a 'storytelling empathy machine', and to promote empathy with characters by communicating localised, human-focused stories of climate change impacts (Swim & Bloodheart, 2015), linked to the global context through integration of corporate, political and media interests through the story. In contrast with Muradova and Beauvais (2025), Game Changers featured positive endings for the group of climate activist avatars, where they succeeded in holding corporate power to account and building community. The broadcast was recorded and can currently be viewed at the game site https://www.playgamechangers.com/, where resources for further learning and action can also be found. Drawing on an analysis of observations of two live stream broadcasts, online chat comments and a post-game questionnaire, we identify and discuss four design features of online narrative games that enable learning and exploration of climate action: integration of climate change, interaction between players and the game, intervention in the game's narrative and technical and artistic innovation. First, we contextualise the game in the context of research on games and climate change education and communication.

Games and climate change education and communication

A wide range of types of climate change games exist, from computer and mobile games to board games, card games and offline facilitated experiences. Games are uniquely placed to help people understand, care about and act on climate change, and all of these formats have been used to promote engagement and education on climate change (Wu & Lee, 2015). Many climate games are designed

for learning purposes (Gerber et al., 2021) with a focus on conveying basic declarative knowledge (Eisenack & Reckien, 2013), developing understanding linked to personal behaviours (Leitão et al., 2021) or addressing misconceptions and tackling misinformation (Cook et al., 2023), although research on the *World Climate* simulation indicates that feelings are more important than knowledge for stimulating interest and desire to act (Rooney-Varga et al., 2018). In the world of narrative online games, Muradova and Beauvais (2025) found that the 'choose your own adventure' game increased empathic concern, and that empathy mediated effects of the game on pro-environmental beliefs, although not always in a positive direction. Muradova and Beauvais (2025) highlight the complex interaction between empathy, emotions and climate actions, particularly when players are presented with negative scenarios. Game Changers attempted to find positive scenarios through successful community action on climate change.

Two studies (Fernández-Galeote et al., 2021; Ourachi et al., 2018) examine broader engagement through climate change games. These studies have identified game attributes which support climate change engagement. Ourachi et al. (2019) propose a framework for climate change engagement through online video games, drawing on interviews with experts in game design and research with young people, and Fernández-Galeote et al. (2021) extract game characteristics from a systematic review of research literature on climate change games. Both studies identify game attributes that are associated with cognitive, affective, behavioural engagement, and Fernández-Galeote et al. (2021) also include game experience as a dimension of engagement. Game elements that support play can be achievement-oriented (e.g. tasks, quizzes, levels), social-oriented (e.g. cooperation, competition, voting) or immersion-oriented (game world, narrative, use of avatars), as well as including resources and materials such as digital objects and facilitators (Fernández-Galeote et al. (2021). Fernández-Galeote et al. (2021) note that digital experiences tend to lack social elements, with achievement-oriented elements most common in the published literature. Whilst these frameworks are useful in considering the range of attributes that might be useful to consider in designing games, the specific attributes that facilitate engagement are likely to depend on the purpose of the game, the audience and the format. We return to these frameworks in the discussion, following details of the creation, broadcast and evaluation of an online game.

Beyond game characteristics and engagement, there has been theoretical attention to learning through games. Cutting and Deterding's (2024) task-attention theory of game learning proposes that beyond the content of a game, task-based design features such as game mechanics, goals, uncertainty and rewards direct attention to task relevant information which is learned. The demands of the task (e.g. time or performance pressure, cognitive and perceptual load) and non-task-based demands on attention also affect learning. The major contribution of this theory is that learning is moderated by attention, and that people are more likely to learn what they attend to. Within a game world, there is

an array of stimuli that people can pay attention to, and from which they selectively attend to. Cutting and Deterding (2024) contrast games with non-interactive media in terms of what users (players, viewers, readers) can or cannot do, noting that the facility of interactive media is that specific tasks direct attention, and therefore can be used to engage players with specific concepts. Game designers can therefore use mechanics, goals, uncertainty and rewards to direct players' attention towards relevant information. They point out that little is known about which game design features (e.g. mechanics, goals, rewards or uncertainty) attract attention, with existing research based on abstract tasks; e.g. eye-tracking studies outside real game play.

Game Changers

Game Changers was a live online narrative game bringing together audience members to collectively explore the impacts of climate change and climate action. It merged film, theatre and gaming, with immersive techniques. Throughout the development period, authors (the game developers, a script writer, researchers) held workshops and regular online meetings to explore our understandings of climate change, and decide the priorities for the game and the type of story to be told. An iterative, co-creative approach was used to develop the game beyond the project team. Developing ideas were discussed with expert and audience panels spanning multiple diverse identities, including those identifying as marginalised and underrepresented in gaming (N=14), a national youth theatre organisation (N=12) and a user group to test the concept, narrative, integrated research and game mechanics (N=10). Collective creation, or devising (Oddey, 1994), was used as a method of theatre-making to explore the characters and concepts and produce the final output, rather than starting from a script that had already been written. Co-creation was also used for character development, where young actors collaboratively built character profiles and tested these out using hot-seating and in-character interviews. The environment, plot and characters highlighted the causes (e.g. fossil fuel consumption) and impacts (e.g. flooding, migration) of climate change, as well as some responses (spongy cities, transition to renewables, low consumption and reduced waste cultures, civic and political action), presenting some of the realities of climate change as well as adaptive possibilities. The final game was scripted by a writer (author 2), with creative direction by author 5 and technical direction by author 6.

Act or phase of devising	Description
Contextualisation and research	Establishing foundational knowledge and background
Practical exploration	Engaging in hands-on activities to explore ideas
Interrogation	Delving deeper into concepts and challenging

	assumptions
Experimentation and extrapolation	Testing and expanding on the ideas generated
Refinement	Polishing and finalising the content

Table 2: A five-act framework developed and facilitated by the theatrical director

Like other forms of climate education and communication, games hold the potential for psychological harm by inducing negative emotions in players (Muradova & Beauvais, 2025). Anxiety is a reasonable response to the IPCC's conclusion that climate change 'is a threat to human well-being and planetary health (very high confidence). There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all (very high confidence).' (IPCC, 2023). We consider it responsible to confront these realities, and to focus on mitigating effects through action on climate change. We modelled the power of community action through the novel 'choose *our* own adventure' mechanic, highlighting the collective dimension to acting. To address negative feelings, we created space to share in the online chat, and provided links to support networks on the platform.

The game blurred boundaries between live theatre and video games to tell the story of a group of activists living in Greenview, a city in the north of England in the near future. It consisted of two two-hour episodes, and was broadcast twice. The audience participated in in-game decisions about what actions to take. Game Changers was acted and live-screened using full body motion capture, with three studio actors who portrayed animated avatar activist characters in a world rendered in the Unreal games engine (Figure 1). The actors were joined by a fourth actor playing a robot, ECO (Ecological Collaborative Oracle, Figure 2), who interacted with the online audience by responding to the chat in real time during transition between game environments, singing and asking the audience questions. The story followed the three activists and ECO as they responded to flooding and fossil fuel interests in their city. Collective decision-making with space for discussion was incorporated into the broadcast and play using real-time 'choose our own adventure' mechanics. The audience influenced the plot and dialogue through polls and online chat functions, mediated by ECO, with each decision chain reflected in the script. Through scripted and improvised performance, the actors played out the scenarios through the livestream as selected by the general public. The game was broadcast on a bespoke platform with minimal distractions. This focused attention on the game world, minimising cognitive load for players. A 'see the studio' function allowed players to switch between game view and studio view. As well as the technological and creative novelty, the topics featured in the game - corporate and political power, climate justice and climate action - have not previously featured in research on climate games (Fernández Galeote et al., 2021).
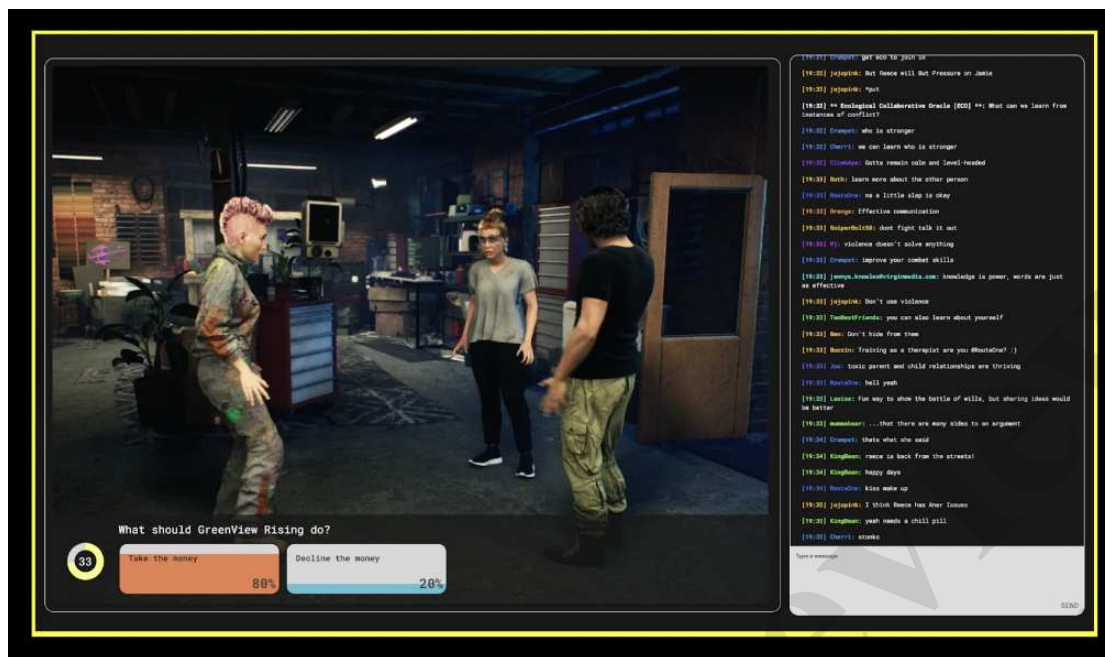
Figure 1: Screenshot of the characters rendered in Metahuman Creator during an audience 'choose our own adventure' intervention point.

Figure 2: Ecological Collaborative Oracle (ECO) interacting via the chat. ECO also interacted through speech, song and movement. ECO's display reproduced audience chat.

The game was broadcast for play twice to enable audiences to take different perspectives and try out different consequence chains. We report on the design, play and evaluation of Game Changers in relation to how it enabled education and communication on climate change and activism.

Research methods

The game was broadcast during August 2022 on a number of platforms with a total of 154 people accessing the game on the custom website, 416 players accessing on YouTube, 116 on Twitch, 56 on the National Youth Theatre (NYT) YouTube site and 158 on NYT's Facebook. We present data only corresponding to the live stream on the custom website. There was attrition between episodes (42% for the first screening, 23% for the second). Of those accessing the game on the custom website, 128 participated in online chat. The initial audience reach was lower than anticipated, and likely to be due to a number of factors including the use of a bespoke platform (optimised to minimise lag) rather than gaming platforms such as Twitch, and screening during warm summer evenings.

A sequential qualitative research design was used, with observational research used to investigate how audience members experienced climate change through the game, and a post-game survey used to understand audience responses to the game. Observational research in real time is useful for studying games where players have gathered for a sociable, playful experience as it is minimally intrusive. The question guiding the study was:

What features of an online narrative game facilitate engagement with climate change?

We use comments in the live chat and post-game survey as indicators of engagement. Observation allowed us to collect authentic, live data during the broadcast, rather than relying on second hand accounts and memories, ensuring the research had high ecological validity (Cohen et al., 2017). Ethical approval was obtained from the relevant institutional ethics committee. Author 1 took the role of non-participant observer during the live stream, and used an unstructured approach to the observation. The first data source used in this study was live user-generated content within the chat interface on the custom website during the first broadcast of the game. The research units for this study are the chat posts, rather than the audience members posting them. There is some discussion as to whether online data sources such as these, which are openly available online, should be considered documents or people (Wilkinson & Thelwall, 2011) . Whilst we have taken the approach that the chat is publicly accessible in the same way as an electronic document published on the internet, people contributing to the chat were informed that their contributions would be used for research purposes and invited to create a pseudonym. We did not collect identifying data from contributors. It is therefore not possible to know who actually posted. We also recognise that the notification may have altered the dynamics of interaction as audience members as they are made aware that their interactions may be observed.

Posts were attributed to 128 unique usernames. A total of 2294 posts were made. Posts tended to be short, ranging from 1 to 284 characters, featuring text, textese, emojis and emoticons. Content analysis was used to analyse data from the online chat and qualitative data from the post-game survey, drawing on the definitions and approach described by Mallon and Lynch (2014). An inductive approach was used, with analysis data- rather than theory-driven, and large amounts of text systematically reduced into fewer categories through coding. The data from the chat and evaluation comments were analysed first to identify climate change content in audience comments, and secondly to characterise the dialogue and its connection to live game play in order to identify game features that facilitated climate conversations. Authors 1 and 7 coded the data independently, and met to discuss discrepancies and interpretations of codes. We cannot know the extent to which the data from the game chat forums are representative of the broader population.

The second dataset was an end-of-game survey on audience responses to the game and to the topic of climate change, administered immediately post-game. There was a low response rate to the post-game survey (N=42; 27% of players). This self-selection bias means that survey respondents might not be representative of the wider audience. This is mitigated in part by the use of observation data from the chat posts, although again, not all players interacted. The tension between voluntary participation and representative data has been described as the 'volunteer participation paradox' (Hiratsuka, 2025). We chose to prioritise voluntary informed consent, so we must be sensitive to silences in the interpretation of the findings. Only a minority (N=15) of participants responded to a separate diversity monitoring survey. Whilst it is not possible to generalise from the small sample, people of a range of ages, gender identities, sexualities, religions, ethnicities, social classes and (dis)abilities provided responses to their experiences of playing the game. The survey contained closed and open questions on behaviour relating to game playing and climate change and included the questions 'Did the show make you feel interested in the topic of climate change?', 'Has the show made you feel like you want to take real world action on climate change?' and 'What are you going to remember from this? Will anything stay with you?' Descriptive statistics (counts and percentages) were calculated from the closed questions, and a qualitative content analysis used to analyse the open response questions. The findings are presented according to these themes: integration of climate change content, intervention in game direction, interaction with peers and characters and innovation.

Reported impacts are reported below, followed by ways in which players reported feeling inspired to act. The section concludes with audience feedback on how the live game experience could be optimised in future.

Findings

The majority (62%) of respondents to the end-of-game survey reported that they played games regularly, at least monthly, with only 7% never playing games, indicating that the audience of game players was reached. Most (79%) audience respondents said that Game Changers made them more interested in climate change, with only one respondent reporting that it did not. Just under half (48%) said the show made them feel more like they want to take real world action, 17% said it didn't, with the rest unsure.

Lasting impressions identified by the audience included positive responses to innovation (quality of the visuals and sets, technological innovation and quality of resources), integration of climate change through characters (especially ECO) and plot (specifically how climate change and collective action were represented, learning what greenwashing is, and how considerations of diversity in policy discussions was represented), interactions with others in the chat and intervention in the game through interactions with ECO that allowed players to influence the agenda in the game.

In the chat, most posting was in response to game choices or prompts from ECO. A minority of posts related directly to climate change, with others relating to other aspects of the plot, comments on the game and technology, or social conversation. The game was compared to other games ('is this GTA 6?') television programmes ('it's like Eastenders') and films ('it's giving mockingjay for climate change'). Following the analysis of the online chat and feedback in the post-game survey we identified four key features of the game that facilitated climate change conversations. These four characteristics (integration, interaction, intervention and innovation) are presented below and then discussed in relation to the characteristics identified by Ourachi et al. (2019) and Fernández-Galeote et al. (2021) and to Cutter and Deterling's task attention theory (2024).

Integration of climate change

Integration of climate change in the plot, characters and scenery made climate change explicit as a concept within the game. Where comments related to climate change, they were most commonly in response to plot, dialogue, commentary on the game world, and prompts from ECO. The story did not go into detail on the mechanisms driving climate change, but rather focused on human activities such as consumption and the use of fossil fuels as causes of climate change, the impacts of climate change (specifically flooding) and responses to both causes and effects of climate change. Evidence of some adaptations were seen in the world, including the use of green infrastructure and renewables, active travel paths and re-use exchanges. Obstructions to climate action were also featured in the storyline, including the relationship between corporate power and politicians, and faith in technoscientific solutions.

The integration of climate change as a driving theme for the characters and plot enabled an aesthetic experience, critique of corporate power, discussion about trust in science, politics and activism, and learning about related concepts such as greenwashing. This was reflected in both the chat and in survey responses. For example, one survey respondent reported that the game *'Made me more conscious in my personal life, and also made me look into what bigger companies are doing for the cause.'* When prompted in game, players shared ideas for climate actions needed. These were classified by type and some examples are presented in Table 4.

Type of action	Example quotes from chat
Consumption	Let's just consume less of everything Use less tech
Cultural	Create a new legal/mental framework that values more than human interests Strong regulations on manufacturing
Economic	Tax the rich Universal basic income
Energy transition	Stop oil. And gas. Electrify everything and power with renewables
Food	I reckon a lot of us could eat less meat.
Nature-based	Restore important ecosystems Rewilding
Technological	Fusion power Local electric grid and generation
Travel	Less flying!? Improve electric cars

Table 4: Types of climate action identified by players

The near-future setting was relatable, with players pointing out connections with their locations, *'severe floods… sounds like newcastle today lol'* or related events as with the reference to a Just Stop Oil protest, or, in response to visible sewage in the flooded city, *'This government is allowing water companies to discharge unimaginable amounts of raw sewage into our river and the sea already'.* The integration of climate impacts in the context of flooding triggered empathy in the chat, linked to hope that change is possible:

Poor people :(

i feel really sad for the people in here

😭😭😭😭 this is sad

no why is this making me guilty

i hop[e] we can change soon

There was evidence in audience post-game feedback that the game inspired action. Actions included intentions to become more informed about climate change, to find out more about what bigger companies can do and about existing policies, raising awareness amongst others of issues and solutions, trying to change other people's perceptions of climate change, using their role to make change in their own contexts, calling out inaction on climate change and taking action to hold politicians and corporations accountable. Amongst those for whom the game did not make them more likely to take action, there was some discussion of feelings of powerlessness. Some were already involved in climate action, and reported affirmation or feeling more hope after the game. Others felt that structural change, for example investment in renewables and making these more affordable, and the introduction of fines for companies engaged in unsustainable behaviours, was needed. For example:

> *The question of how to influence the agenda effectively will stay with me.*

> *To continue to bring awareness of climate change to all. To hold politicians and corporate companies to account. They "talk the talk, but don't walk the walk"!*

Chat comments tended to respond to decisions in the game or prompts from ECO, with relatively few extended conversations taking place.

Intervention in game direction

Players were able to intervene in the game by communicating with ECO via the chat and by collectively determining the direction of the plot at predetermined points. The decision was made by voting between options: the majority decision determined the story branch, with actors responding in real time from a script developed for that specific pathway. This took some getting use to and discussion in the chat:

> *I assume we are the data points?...so wait, I am just a self aware bit of data. Oh my... Am I real?*
> *Don't glitch out on us! We are ALL data points.*

Intervention through choices in the game world enabled agency in the game and the exploration of different futures. The collective 'choose *our* own adventure' rather than the more common 'choose *your* own adventure' was intended to encourage audience members to discuss the different options, and present another layer for reflection on how to influence decision-making. This was an important part of the game, reflecting the collective nature of decision-making and creating space for disagreement. During the decision-making time, actors improvised in character before advancing the plot in the selected direction. There were different responses to this mechanic. Some appreciated the collective decision-making, whereas others felt a loss in agency when their choices were not selected:

> *we as the data points for eco collectively were able to lead the team to do good. therefore, something we can do all together in actual reality*

> *from the very first decision it went against what I would have chosen if playing alone and that kind of put me off because it immediately felt like it wasn't my game that was unfolding.*

Where ECO prompted reasons for decisions, these were justified in the chat. Extracts are presented in Table 3 for a branched choice where GreenView Rising (the collective of climate activists) had to decide whether or not to accept funding from Terracore, the fossil fuel corporation.

Why have you decided to **accept** the funding from Terracore?	Why have you decided to **reject** the funding from Terracore?
➢ more funding for bigger projects ➢ not all of us did :(➢ ikr ➢ change from within ➢ Without money, we can't do anything. With it, we can still determine terms. ➢ money is better in the hands of people that will use it for good ➢ Get some progress straight away. You can then make other companies that don't invest in other initiatives look like they aren't matching Terracore ➢ wasn't it their goal to get terracorp to actually put money behind climate goals?	➢ They'd have them over a barrel ➢ their interests are in themselves as a company, not the public ➢ As many here said, it would compromise their values, public trust, and trap them in a pernicious collaboration ➢ If accepted, they would become part of that corporate greed (and hate themselves). ➢ short term decision to take the money - we want long term change! ➢ offering money there is always 2nd agenda behind it ➢ Dirt bag money ➢ Terracore must pay for the damage caused to the environment and has no right to ask us to continue fighting

Table 3: Extract of discussion at a decision point.

Intervention in the game was an area where people wanted more: more opportunities to influence characters and more points to change the course of the action, with some reporting that they watched as a film rather than played the game. Others wanted a way of finding out what would have happened had they chosen the other options. This indicates the need to ensure extended time is provided to deliberate possibilities (perhaps facilitated by a character such as ECO) in games with a choose *our* own adventure mechanic. Removing the collective decision-making, the game could be recorded and used as a branched individual story as an asynchronous experience.

Interaction

Interaction between peers and with characters enabled pleasure through play, climate conversations and learning. Players used the chat to speak to each other, to ECO and to encourage or plead to characters through ECO. Comments were integrated into the narrative and news reports in the game. The chat was used for social and game-related discussion. Interactions were mainly in response to prompts from ECO or commentary on the plot, although there were some exchanges between players, often on technical themes or running jokes (e.g. about tea drinking), or where a player had specific knowledge, e.g. below on flood plains:

> *@ANONYMISED flood plains are the natural overflow for rivers, they flood so that other locations don't. By building on them you're literally putting houses in the places most likely to flood. And it causes the water that would be on the flood plain to also flood other areas*

Topics discussed in the chat included technical troubleshooting, discussion about whether the characters were real or AI (prompting the facility to toggle between the show and studio view), trust in politicians and the government and comments on innovations in the broadcast, particularly studio view.

A second way the audience was able to interact was with the cast via ECO through the chat. ECO was voiced by an artist with expertise in improvisation, so was able to respond live to audience comments and to interact during transition points. Love for ECO was shared via the live chat and the post-game questionnaire, as one respondent noted: *'I will remember ECO and what an innovative and different approach to climate change it was.'* Audience members commented on the personalisation that this enabled, the interactivity, the humour that this introduced, and the way in which this was integrated into the performance, for example through news reports. Participants asked ECO about a range of topics related to climate change (e.g. energy sources, vegan recipes, about greenwashing) and social (e.g. requests to sing, tell jokes, whether ECO can sleep, believed in witches and their relationship with Alexa and Siri), posing a range of climate change-related questions like 'Is it okay to

use power while seeking to get others to use less power?' and 'Eco, if the planet gets worse and uninhabitable by humans, do we have any traditions you and your kind would carry on?'. ECO tended to improvise on themes other than climate change, and a few players kept asking ECO the same scientific or technical question which ultimately went unanswered, indicating a need to ensure that improvisation includes climate change content as well as the more playful themes.

Innovation

The majority of respondents to the post-game survey (84%) felt the show was innovative or used technology in a new way.   One person commented that '*it's a more human way of approaching these subjects, it almost feels like being in an immersive and interactive theater, while many were able to react, it feels good not to be alone in the face of these problems*'.

Lasting impressions identified by the audience in the post-game questionnaire included positive responses to climate change addressed in a game, interactions with others in the chat, interactions with ECO that allowed players to influence the agenda in the game, the characters (especially ECO), considerations of diversity in policy discussions, learning about greenwashing and how companies do this, the quality of the visuals and sets, the innovative use of technology, the quality of associated resources and how the game demonstrated the power of collective action.

> *already very engaged in the topic; the show is a good alternative to the bleak reports in the media*

> *I loved the way the tech was used to tell this story and share this conversation - it was innovative and I'm excited to see how this evolves - particularly in engaging younger people*

One audience member commented mainly on the technical innovation in their feedback:

> *use of the chat as a character in-world, use of that character as a backup system over crashes. Show studio toggle. Maybe some broken metahuman hands, but ultimately this was Incredible stuff. Some of the best use of the tech I've seen.*

This indicates the importance of a quality game environment with opportunities for the audience to participate in social interactions. Novel social interactions which allowed the audience to interact as data points through the character of ECO were particularly successful.

Audience feedback suggested a number of ways in which future productions might have greater impact. These included a sustained campaign leading up to the broadcast of the game and the linking of actions in the game to the real world. For example, using social media to introduce the characters and technological innovation and draw attention to some of the impacts of climate change.

Innovation was also a challenge. By merging XR technologies with theatre, film, gaming, storytelling and the visual arts, there is no well-established way of communicating the nature of the game to audiences. Feedback from the audience suggested that more communication about the innovations in Game Changers would have been useful in advance. For example, by providing information that the experience could be optimised by using a desktop or laptop rather than a mobile device. Some respondents did not initially realise that the show was being broadcast live and involved real actors, and others took time to realise that their interactions (voting, interactions with ECO) were integrated into the story. These were resolved in part by the studio view in the later episodes, but more specialist marketing could use these innovations to draw a larger audience into the game.

Discussion

The UN Framework Convention on Climate Change (Article 6) and the Paris Agreement (Article 12) commit to action for climate empowerment: that is, the empowerment of all members of society to engage in climate action through climate change education and public awareness. There has been critique of the way in which the IPCC communicates climate change, with calls for visual framings that connect emotionally with people, highlighting more local and near term perspectives (Wardekker & Lorenz, 2019). Games are increasingly being used to achieve this goal, and previous studies have identified cognitive, affective and behavioural characteristics, along with game experience characteristics that result in engagement, and theoretical studies have explained how games might be designed to direct attention to learning-related content and tasks. Our findings are novel in identifying the importance of integration of climate change content, in-game interaction, technological innovation and the ability to intervene in the game world as important in directing attention to climate change.

The findings from Game Changers observational research provide some empirical validation for Cutting and Deterding's (2024) task-attention theory, if we take chat comments and survey responses as proxies for learning. Comments in the chat were most commonly in response to plot, game choices, dialogue, commentary on the game world, and prompts from ECO, indicating that game design decisions influence where players place their attention. In Game Changers, integration of climate change into the game world, characters and storyline, as well as into the interaction (peer and ECO) and choose our own adventure intervention mechanics directed attention towards related themes such as recognising greenwashing and different forms of action. A choose *your* own adventure

game mechanic has previously been found to increase empathy in individuals, and to be associated with mixed emotions (Muradova & Beauvais, 2025). We also had mixed responses to the choose *our* own adventure mechanic, indicating that some individuals found it disengaging when their options were not selected. A design feature to enable deliberation prior to the selection of options, or debrief post decision before action resumes, may be useful in games using this mechanic to keep these audience members in play, as well as for creating a space for disagreement and discussion on themes such as activism and critique of capitalism that have been forced out of public dialogue in educational spaces.

Game Changers had attributes consistent with those in the framework developed by Ourachi et al. (2019), and elements described by Fernández Galeote et al. (2021), although it would not be possible to integrate all of these elements, not least because some are mutually exclusive. These elements are represented in Figure 3 as a new '4I' model for attention to climate change through online narrative games. It links empirically observed game elements to specific facilities that direct attention to climate change, rather than to types of engagement. In this way, it provides a tool for reflecting on the specific game elements that enable climate change engagement, exemplifying but not prescribing *how* this can be done. There may be other facilities that can direct attention to climate change in online narrative games, and we present this model as a stimulus for planning, reflection and critique by researchers, game designers and climate educators and communicators.
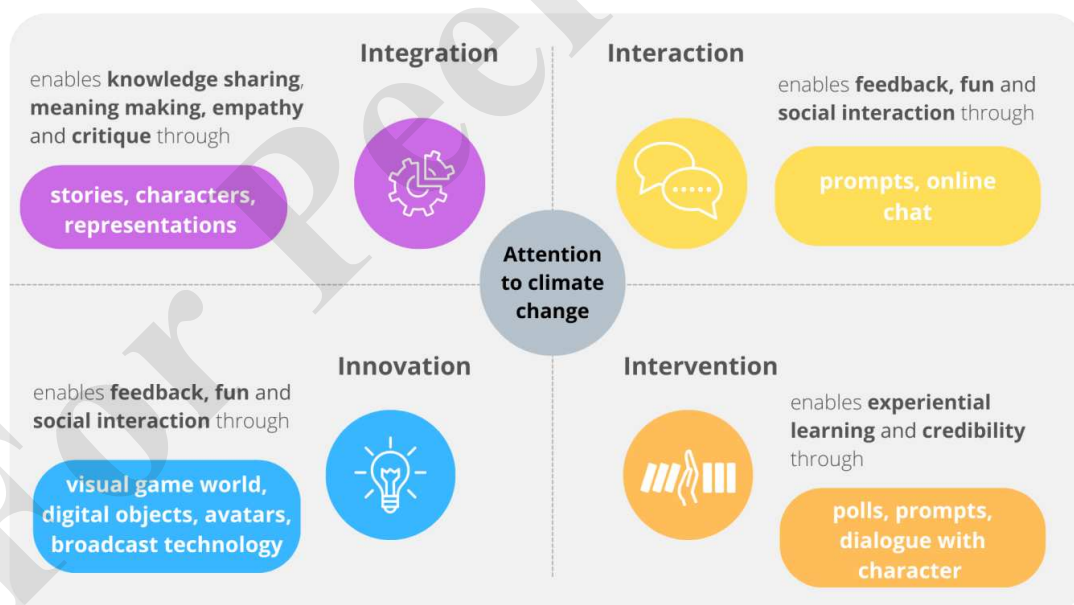

Figure 3. Attention to climate change through online narrative games: A '4I' model incorporating the findings of this study with game elements that facilitate engagement from Ourachi et al., 2018 and Fernández-Galeote et al., 2021.

Narrative was integral to the game, simulating reality in the near future. Social networking was made possible through the chat on the game platform and other social media sites where streamed. The challenges were in players' reach (in and out of the game), climate change information was based on trusted sources including the IPCC, and presented in game mechanics, character and plot rather than as statistics. Furthermore, we were able to draw attention to the role of media, corporate and fossil fuel industry interests in obstructing action on climate change, and bring to life the consequences of inaction, in ways that might not be possible in formal education settings, responding to the call from Eaton and Day (2019) to teach about the power, influence, and interests of fossil capital. Player agency was important in the game and whilst we did not tell players what to do in- or out-of-game, we provided resources for players to explore, and asked questions that invited players to share what can be done, with answers ranging from the personal to the systemic. Some players accessed these or wanted to seek further information elsewhere, use new knowledge about greenwashing and call out companies when they do wrong. Creating space to learn about corporate power and strategies used to obstruct action is important to build broader understanding of how climate-related decisions are made, and how people, organisations and politicians are influenced, a key theme in the play Kyoto (Murphy & Robertson, 2025). What remains is the question over how challenge and critique can be translated into real-world action, with some players feeling powerless and wanting clear and achievable real-world strategies for making the systemic change.

Game Changers was a research and innovation project, funded by a research council. This means that the game could be made openly available to audiences at no cost to players. Two novel features: the choose *our* own adventure mechanic (where the collective decision-making determined the direction of the story) and interaction through ECO required live play so that actors could respond, as characters, to audience decisions and conversation in real time. This presents limits in terms of cost and scalability. Alternative narrative games might use pre-recorded action, with all decision pathways filmed, and focus the live interactions on ECO during transitions and on interactions in the chat. To avoid losing the collective decision-making mechanic, there would need to be an episodic element to game play, with scheduled play sessions. Streaming platforms such as Netflix now offer games, presenting a future pathway for commissioning and streaming convergent technology such as Game Changers.

Conclusions

The purpose of this study was to examine the possibility of an online narrative game to stimulate engagement with climate change. The observational study of player interaction and feedback contributes to knowledge about climate communication and education by identifying four key game elements that direct player attention to climate change in narrative games. These are: integration of

climate change as a theme, opportunities to intervene in the game direction, interaction with peers and characters and technical and creative innovation. These features appear to unlock ways for players to cognitively, affectively and behaviorally engage with themes through the gameplay experience, working by directing players' attention to climate-relevant content, and supporting players to increase interest in climate change and climate actions.

The study suggests practical implications for designers of climate games. For games that are novel across multiple dimensions (here, for example the convergence of theatre and games, the use of a 'choose our own adventure mechanic', the metahuman rendering of live action and interaction with the cast through ECO) it would be beneficial to include an audience building and communication campaign with a significant lead time into the production schedule. This might involve trailing key innovations, e.g. previews of the game world and live interactions with ECO on social media to build an audience, and potentially feed into the game live stream and stimulate climate action. During broadcast, live climate education support could power ECO to increase improvisation on the theme as more climate change related prompts from characters are likely to increase engagement with the theme. More time for group deliberation prior to decision-making on the story path would also likely increase engagement with climate change. It is important, however, not to restrict the conversation to climate change, and to encourage social interaction on other themes to build audience rapport with each other.

We believe that experiments in narrative forms, such as online narrative games, have a role to play in climate empowerment. Future themes might include imagined worlds without oil, and a focus on adaptation, with settings on climate frontlines around the world. We believe that there would be value in researching the co-creation process, and in particular what learning results from interdisciplinary collaboration on the theme of climate change. In terms of limitations, although we have some self reported learning and intended behaviours, the study cannot tell us what players actually learnt or did in the real world as a result of the game. Future studies might explore greater integration into the real world, perhaps in association with global climate change events. We also don't know the thoughts or feelings of those who watched rather than played, or those who left the game. Nevertheless, we have identified ways in which different game elements directed attention to climate change content and stimulated discussion.

Games are uniquely placed to encourage climate communication: they are played for pleasure and can create space for conversations connected to, but not limited to, narrow policy points. In Game Changers, players could change the game to tackle climate change. As the urgency of the need for climate action heightens, narrative games are a way of identifying obstructive political and corporate actions and testing out different ways to tackle these in order to play for the planet.

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