

Supplementary material S3: Results of the qualitative content analysis of serious games.

Table S4. Results of identification dimension.

Name of game	URL/App	Type of creator	Language	Communicative objective	Brief description
Build a Kit	< https://www.ready.gov/kids/games/data/bak-english/index.html >	Official Website of the United States Government	English	Developing familiarity with subject matter and acquiring knowledge about how to react to disasters.	Various questions to answer that promote reflection on how to act in those circumstances.
Disaster Master	< https://www.ready.gov/kids/games/data/dm-english/ >	Official Website of the United States Government	English	Developing familiarity with subject matter and acquiring knowledge about how to react to disasters.	Various questions included in a narrative to answer in order to verify comprehension of story and promote reflection on how to act in face of natural hazards.
Stop Disasters	< https://www.stopdisastersgame.org/stop_disasters/ >	Website of the United Nations Office for Disaster Risk Reduction (UNDRR)	English	Developing knowledge of prevention to decrease probability of disaster.	Simulation in which player creates territory with lower probability of experiencing natural hazard, analysing buildings within it.
Earthquake Relief Rescue +	App	Atif Mumtaz	English	Developing knowledge related to topic.	Simulation in which victims of an earthquake are searched for and rescued in a city that has been devastated, with assistance of a dog.
Disaster Rescue Service	App	Syd Umer Aftab	English	Developing knowledge related to topic.	Simulation in which victims of a major flood are searched for

					and rescued using a boat or a helicopter.
Geostorm	App	Talespin	English, French, German, Polish, Portuguese, Russian, Italian, Spanish, Turkish, Chinese, Hungarian	Familiarisation with mode of operation.	Player surpasses various levels to escape from a building destroyed by a natural hazard.

Table S5. Results of gameplay dimension.

Name of game	Build a Kit	Disaster Master	Stop Disasters	Earthquake Relief Rescue +	Disaster Rescue Service	Geostorm
Number of players and usage (individual or multi-player).	1, for individual or multi-player use	1, for individual or multi-player use	1, for individual or multi-player use	1, for individual use	1, for individual use	1, for individual use
Type of player.	Explorer	Explorer	Explorer / creator	Explorer	Explorer	Explorer
Level of interactivity.	High	Medium	High	High	High	High
Game duration.	Depending on prior knowledge, from 15 minutes to 1 hour.	From 45 minutes to 1.5 hours or more.	One session, one hour; the entire game, days.	More than an hour. Days.	More than one hour. Days.	More than one hour. Days.
Game mission.	The aim of the game is to select the correct tools to survive a disaster; if you do not select them or choose the wrong ones, you will not progress to the next scenario.	The objective is to verify that the player understands how to react to disasters or prevent risks from the comic by asking questions about things that have been said in the story. If you answer too many questions incorrectly, you lose the level and have to start over. At the end of a level, you receive a password that allows you to play the next level.	The mission is to invest the starting money that the player has in improving the resilience of buildings, creating buildings to protect the entire population, or building defences. The game indicates the probability of the catastrophe occurring, which increases over time until it happens, and you check if you have saved lives with your modifications or not.	The aim of the game is to guide the rescue dog to the trapped person using the mobile phone/tablet controls.	The objective of the game is to use different vehicles to find people who need to be rescued.	The mission of the game is to guide the character through a scenario affected by a natural hazard finding the exit from different rooms and searching for the documentation necessary to restore Earth's protection.
Feedback system.	Positive	Positive and negative	Negative	Positive	Positive	Positive
Reward system.	Yes, next level.	Yes, next level and game points.	Yes, congratulations on saving lives and game points.	No	No	No
Availability of instructions / possibility of saving game (yes, no)	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/Yes

Table S6. Results of narrative dimension.

Name of game	Build a Kit	Disaster Master	Stop Disasters	Earthquake Relief Rescue +	Disaster Rescue Service	Geostorm
Relevance of narrative	Medium	High	Medium	Low	Low	Medium
Global History	The player joins Gayle and her friends in aiding them to gather supplies in preparation for an emergency. The player progresses through various levels in which they must select the appropriate tools for themselves and their family to survive a natural hazard.	The overarching framework is the narrative of a comic-style story in which you have to answer various questions about natural hazards to earn points. There are eight different levels, so if you score enough points to complete a level, at the end of it, you receive a password that allows you to move on to the next level. Each level deals with a different natural hazard.	At the beginning of the game, you must choose a natural hazard: tsunami, hurricane, fire, earthquake, or flood; and thereafter build upon an already established community to provide defense and enhance structures for the inevitable natural hazard that is to come.	A major earthquake has struck the city, roads and buildings are destroyed, and there are various injured individuals in need of rescue. With the assistance of a trained dog, the task is to locate these injured individuals.	The player acts as a rescue services specialist, saving lives and assisting individuals affected by floods in a large city by transporting them to a safe area.	Following the sabotage of a network of weather satellites that protect the Earth, a series of meteorological catastrophes are destroying several cities worldwide. The game involves gathering essential data to prevent a geostorm and escape from the affected areas.
Representation of character	Gayle, a girl in a wheelchair, and her friends are a group of teenagers from diverse ethnic backgrounds.	Once again, it is Gayle and her friends: Raina, Sonny, Misti, Ray; in various scenarios where they encounter numerous natural hazards.	There is no character	A man and his dog, without mentioning any names.	Various impersonal characters: helicopter or boat pilot, doctor, and rescuer.	A SataCorp office worker in Dubai, an astronaut stationed at the ISS IV, a communications officer in the special forces, and an atmospheric weather analyst.
Representation of environment	Different settings: Gayle's room, a family living room, a	Each level unfolds within a distinct environment, contingent upon the phenomenon.	Populations are depicted in the following locations according to the	A city devastated by an earthquake.	Simulation of Los Cantos City	SataCorp offices in Dubai, International Space Station IV, a remote village in

	family bathroom, and a convenience store.	The wildfire occurs at a summer camp in Colorado; the tornado strikes at a high school in Iowa; the hurricane ravages Louisiana; the house fire erupts in Connecticut; the winter storm/freezing occurs in Iowa; the tsunami hits Hawaii; the earthquake shakes California; the lightning storm occurs in a park in Iowa; and the heatwave does not specify a location.	natural hazard: for the tsunami, one in Southeast Asia; for the earthquake, one in the eastern Mediterranean; for the flood, one in Central-Eastern Europe; for the wildfire, one in central Australia; and for the hurricane, one in the Caribbean. The populations are represented in a somewhat unrealistic manner.			Afghanistan, and a warehouse complex in Orlando, Florida.
Dimension/ Space/ Scale	Fictitious / local	Real/local.	Real sites, fictional/local	Fictitious / local	Fictitious / local	Fictitious / local
Dimension/ Time	Present	Present	Present	Present	Present	Present

Table S7. Results of contents dimension.

Name of game	Build a Kit	Disaster Master	Stop Disasters	Earthquake Relief Rescue +	Disaster Rescue Service	Geostorm
Terminology employed to describe natural hazards.	Emergency, disaster	Disaster, wildfire, tornado, hurricane/blackout, home fire, Winter storm/extreme cold, tsunami/earthquake, thunderstorm/lightning	Disaster, tsunami, hurricane, wildfire, earthquake, flood	Earthquake	Disaster, flood	Thunderstorm, alert, emergency
Presence of misconceptions or errors regarding natural hazards.	No	No	No	No	No	No
Explicit use of scientific concepts.	No	Wildfire, tornado, hurricane/blackout, winter storm/extreme cold, tsunami/earthquake, thunderstorm/lightning	Tsunami, hurricane, wildfire, earthquake, flood	Earthquake	Flood	Thunderstorm
Convergence with other media and social networks.	Government website: https://www.ready.gov/kids	Government website: https://www.ready.gov/kids/disaster-facts	No	No	Facebook, Youtube	Youtube
Explicit utilization of information sources.	No	No	No	No	No	The film "Geostorm"
Message framework	<i>Themes:</i> Preparedness for emergency or natural hazard. <i>Consequences:</i> Not knowing how to react can lead to	<i>Themes:</i> Natural hazards can occur in any environment and situation. <i>Consequences:</i> Knowing certain actions such as prevention or reaction to natural hazards is necessary to avoid a catastrophe.	<i>Themes:</i> Defences and improvement of buildings to prepare for the inevitable disaster. <i>Consequences:</i> These actions can save lives.	<i>Themes:</i> An earthquake has shaken the city, leaving roads and buildings in ruins. <i>Consequences:</i> There are people trapped who will die if they are not rescued.	<i>Themes:</i> Excessive rainfall has flooded an entire city. <i>Consequences:</i> There are many people who need to be rescued at various points in	<i>Themes:</i> A network of weather satellites protecting the Earth has been sabotaged. <i>Consequences:</i> Cities worldwide are being destroyed by meteorological

	disastrous consequences.				the city via helicopter or boat.	catastrophes. Essential data must be collected to prevent a geostorm.
Images	Static drawings of a teenage girl's bedroom, a family living room, a family bathroom, and a variety store.	Drawings of various scenarios in a comic style.	Basic pixelated drawings of villages.	Scenario of a destroyed city.	Scenario of a flooded city.	Different scenarios previously specified in other sections with high-quality graphics.

Table S8. Results of educational dimension.

Name of game	Build a Kit	Disaster Master	Stop Disasters	Earthquake Relief Rescue +	Disaster Rescue Service	Geostorm
Competencies	CC, DC, PSL, CAE	MC, CC, DC, PSL, CAE, STEM.	STEM, CC, DC, CAE.	DC, CC.	DC, CC.	DC, STEM, CC.
Skills	Remember, understand, apply, analyse.	Remember, understand, apply, analyse, evaluate.	Remember, understand, apply, analyse, evaluate, create.	Remember, understand, apply.	Remember, understand, apply.	Remember, understand, apply, analyse, evaluate.
Problem-solving conditions	Productive reasoning, memory.	Productive reasoning, memory.	Productive reasoning, creativity.	Productive reasoning.	Productive reasoning.	Productive reasoning, creativity.
Need for prior knowledge	No	No	No	No	No	No
Level of difficulty	Medium difficulty	Medium difficulty	High difficulty	Low difficulty	Low difficulty	Medium-low difficulty
Possibility of working in groups	Yes	Yes	Yes	No	No	No
Accessibility (possibilities for people with functional diversity)	No	No	No	No	Yes	No
Interdisciplinary: combination of two or more academic disciplines	No	Yes	Yes	No	No	Yes
Possibility of teacher evaluation	Yes, through correct answers.	Yes, through accumulated points.	Yes, through a life-saving score.	No	No	No

Note: Digital competence (DC); Citizenship competence (CC); Mathematical, Science, Technology and Engineering competence (STEM); Personal, social and learning to learn competence (PSL); Multilingualism competence (MC); Cultural awareness and expression competence (CAE)