

Game Design for Climate Education

Inquiry-based Programming for Teens

Developed by Rebecca Strang



Setting

This program is designed with public libraries in mind, but could be adapted for school libraries or classrooms.

Program Overview

The core focus of this program is for teens to design a board game that will teach players about a climate-related topic in order to spread awareness of global climate issues. Program titles could include: Board Game Design, Meaningful Game Design, or Game Design Challenge.

Inquiry question

How could a board game be designed to teach players something about a global climate issue?

Rationale

According to [NASA](#), Earth's current warming trend has a 95% chance of being caused by human activity between now and the mid-20th century. Evidence of rapid climate change includes: global temperature rise, warming oceans, shrinking ice sheets, glacial retreat, decreased snow cover, sea level rise, declining Arctic sea ice, extreme temperature events, and ocean acidification. The effects of rapid climate change are detrimental to the Earth and the people, animals, and plants who call Earth home.

In a recent [NPR/Ipsos poll](#), 80% of parents and 86% of teachers agreed that climate change should be taught in schools yet only 45% of parents and 42% of teachers actually talk to kids and teens about climate change. An article titled "[Climate Confusion among U.S. Teachers](#)" from [Science magazine](#) discusses how many teachers are not prepared to handle the often politically charged topic in classrooms (confirmed by a [Hechinger Report article](#)) when only half of U.S. adults believe that human activity is the primary cause of rapid climate change.

Awareness for this global issue is vital. Education on this topic is vital. Getting teens to think critically about global climate issues and how they can spread awareness is vital. Teaching with game design is an immersive inquiry experience that explores many avenues of science, technology, engineering, art, and math (STEAM) in a collaborative manner.

Gathering Process

Resources for this program were found by searching [WorldCat](#) for climate and game design texts. Online resources were found by searching government and environmental organizations like NASA, United Nations Environment Programme, and the National Center for Science Education. Online game design resources were drawn from known subject matter experts.

Audience

Participants of this program will be teens (grades 9-12). This program guide is meant for librarians, teachers, and other educators who could run this program in their library/classroom.

Community Partnership Opportunities

This program presents an opportunity for public libraries to partner with school librarians and science teachers, local meteorologists, subject experts at local colleges and universities, non-profit climate and environmental groups, local board gaming groups, and local board game designers.

This program could be run with [Chicago Toy & Games Group](#)'s [Young Inventor Challenge](#) in mind so that teens can work toward a competition submission if they wish. Living local to Chicago is not a requirement for this challenge.

Learning Standards

The Young Adult Library Services Association (YALSA) outlines six programming outcomes in their [Teens First: Basic Learning Outcomes Guide](#). This inquiry-based program meets the following outcomes:

1. Community: This program specifically addresses community in its inquiry question in two ways – 1) teaching others and 2) addressing global climate issues.
2. Creativity: This program gives young people the opportunity to design and invent a board game as an alternative vehicle for education.
3. Digital Citizenship: Digital resources are included in this program’s resource list, some of which include online communities that young people can join to learn and collaborate with their peers and/or mentors.
4. Leadership: This program gives participants control of the direction that their board game project takes – they choose the specific climate issue they want to address and what sort of board game design will best suit their needs.
5. Learning: Participants first have to learn about the climate issues they wish to address and then learn about board game design to determine how to design their games. This program qualifies for STEAM categorization.
6. Literacies: This program requires participants to interact with texts in various media (print, digital, video) and the nature of this program requires participants to translate their literacies into a game that others can play and learn from.

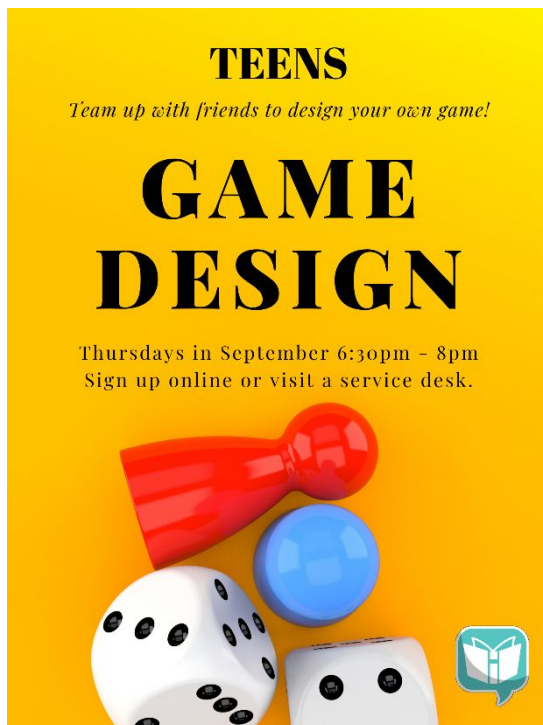
Marketing

This program will be featured in Library’s seasonal program guide, website event calendar, Facebook event listings, public television news updates, and outreach materials that are sent to schools and community centers. There will be two advertising paths: one targeting teens and one targeting parents/educators (who can encourage teens to participate in the program).

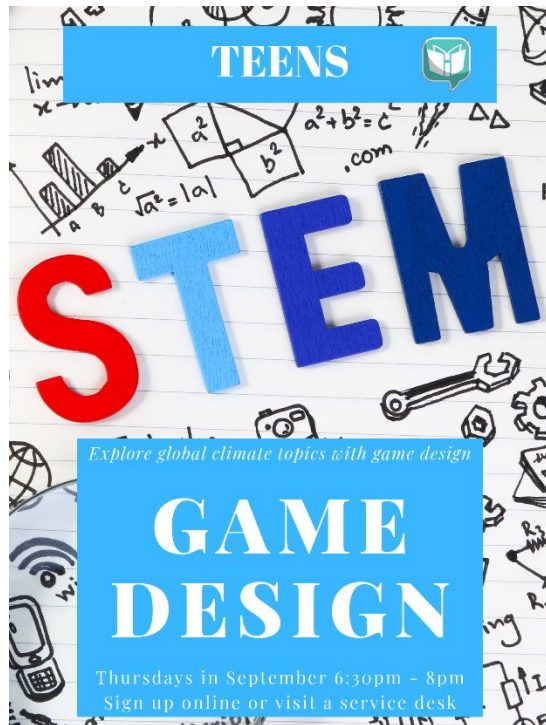
Marketing materials targeting teens will emphasize how much fun game design is, as well as the opportunity to design alone or with friends. Photos will include bright images of board game components and teens playing board games. There will also be mention of the optional opportunity to submit designs to the Young Inventors Challenge. These materials will be sent to schools and community centers like the YMCA where they will be given directly to teens.

Marketing materials targeting parents/educators will emphasize the educational benefits of board games, STEM/STEAM connections to game design, and the importance of addressing global climate topics.

Each example shown below is one way to execute marketing. While either example could speak to both teens and parents/educators, having both styles and messages is important for reaching the largest potential audience.



Teen marketing example created by Rebecca Strang in [Canva](#) using a [background image by Talaj](#). [Full size ad example available](#).



Parent/educator marketing example created by Rebecca Strang in [Canva](#) using a [background image](#) by Wittayayut. [Full size ad example available.](#)

Supplies/Resources Required

Technology

- Laptops (ideally, bookmark the web resources listed in this guide so participants can easily access them)

Supplies

- Paper
- Pens/pencils
- Crayons/markers/colored pencils
- Glue sticks
- Dice (a variety of 6-sided dice)
- Gaming pieces (pawns, markers, spinners, etc.)

This article on the ChiTAG YIC site, *Encourage and Inspire Young Game Inventors with Simple Prototyping Supplies*, provides a list of supplies that can be used for board game prototyping:

<https://www.chitag.com/single-post/2017/03/02/Encourage-and-Inspire-Young-Game-Inventors-with-Simple-Prototyping-Supplies>

Games

Climate: Evolution, <https://boardgamegeek.com/boardgame/182134/evolution-climate>

- Designer: Dominic Crapuchettes, Dmitry Knorre, Sergey Machin
- Artist: Ben Goldman, Catherine Hamilton, Jacoby O'Connor
- Publisher: North Star Games

Petrichor, <https://boardgamegeek.com/boardgame/210274/petrichor>

- Designer: David Chircop
- Artist: Daniela (iella) Attard, Sami Laakso
- Publisher: APE Games

Takenoko, <https://boardgamegeek.com/boardgame/70919/takenoko>

- Designer: Antoine Bauza
- Artist: Nicolas Fructus, Picksel, Yuio
- Publisher: Bombyx, Matagot

Books

Hudak, Heather C. *Climate Change (Get Informed-Stay Informed)*. 2018. 45pgs. Crabtree Publishing Company. \$9.95. (9780778749707).

Selinker, Mike. *The Kobold Guide to Board Game Design*. 2011. 138pgs. Open Design, LLC. \$19.99. (9781936781041).

Program Outline

The program will take place over four 1.5-hour sessions, ideally once per week for four weeks. If you have the capacity to run the program for six or eight weeks to give time for additional playtesting, that would be beneficial, however, it may be difficult to sustain participation in a public library program for that many weeks. This program follows the [Guided Inquiry Design® Framework](#) phases: Open, Immerse, Explore, Identify, Gather, Create, Share, Evaluate.

Session One: Playing Games (Open and Immerse phases)

The first session will introduce participants to the benefits of board games, the concept of educational games, and three existing board games that address some aspect of climate. It will be useful to have two helpers to teach rules when playing games.

Benefits of board games: Open discussion by asking participants how they think board games can be beneficial. Then, utilize the articles from [Scholastic.com](#) and [To Play is Human](#) to discuss the benefits of board games in more detail. (10 minutes) **Concept of educational games:** Start a new discussion about using board games as educational tools. Ask participants what kinds of skills can be exercised when playing board games. (5 minutes)

Three existing board games about climate/environmental topics: Split into three groups to play games ([Evolution: Climate](#), [Petrichor](#), and [Takenoko](#)). (Remaining time)

At the end of this session, participants will be introduced to the idea of games as learning tools.

Session Two: Identify Topics and Methods (Explore, Identify, and Gather phases)

The second session will introduce participants to game design concepts. Participants will also identify a climate-related topic for their game. It will be useful to have two helpers to go between groups to help with questions.

Game design concepts: Open a discussion on game design concepts and discuss the different ways games work (roll and move; resource collection; worker placement; card drafting, etc.).

Resource introduction: Explain the resources available to participants as they explore what they want their games to be about and how they want them to work. (30 minutes)

Break into groups: Ideally, participants will work in groups, but it is okay if someone wants to work alone. The group will brainstorm on and finally agree on their topic and board game style. (5 minutes)

Brainstorm: Groups will use reference materials to explore climate topics and ultimately determine the topic for their game. Groups will also use reference materials to determine how they want to start designing their game (what kind of components, mechanisms, etc.). They should start a design log to record their ideas. (Remaining time)

At the end of this session, groups will have explored climate topics and board game design ideas; identified their game topic and style; and gathered information, ideas, and notes about their topic and game style.

Session Three: Design and Test (Create phase)

The third session will have participants designing and testing their game ideas. It will be useful to have two helpers to go between groups to help with feedback on ideas.

Design: Groups should be building, drawing, or otherwise designing their board game idea. This should be a collaborative process. Anyone designing alone should be making use of the helpers for feedback. They should log their ideas in their design logs and create an art inspiration board if they would like to show artistic inspirations for what a professional production might look like.

Playtest: Designs should be playtested to ensure the design concept comes through in the game play experience. Anyone designing alone should pair with someone else designing alone (or a helper) to playtest each other's game. Playtesting should result in adjustments and changes to the game design.

There are no estimated times for the activities in this session because groups will likely go back and forth between design and playtest.

At the end of this session, participants will have a finalized (or nearly finalized) game design.

Encourage groups to continue using library space if they need more time to finalize their design over the next week. Remind them that they will present their game's topic, rules, as well as their design log and art inspiration board, if they have one.

Session Four: Present Games (Share and Evaluate phases)

The fourth session will have participants sharing their game designs with the entire group. It will be useful to have two helpers to coordinate groups and help show off games.

Share: Each group should present their game, explaining the topic and the general rules for the game. They can share their ideas for what a professionally produced version might look like, along with an art inspiration board. (60 minutes)

Evaluate: Open a group discussion to talk about the experience everyone had with the design process – challenges, accomplishments, and opportunities. What did they learn? Do they have a newfound appreciation for the difficulties of design and/or teaching? Talk about what the participants think about using games as educational tools – what they like, what they do not like. What do they think their games did well? What areas would they improve with more time? An online form could be created using [Google Forms](#) (or similar) to collect feedback data, as well. (30 minutes)

At the end of this session, participants will have shared their designs and learned about other groups' designs, as well as reflected on the experience and self-evaluated their work.

Information for Presenters

When selecting helpers for this program, it will be useful to choose people who are familiar with board games and their mechanisms so that they can answer questions and provide feedback to participants. If there are any [local board gaming groups](#) in your area, you can solicit volunteers there. You could also ask in Facebook groups like [League of Librarian Gamers](#), [Board Game Spotlight](#), [The Boardgame Group](#), or [BoardGameGeek](#).

You can find a [list of mentors](#) on the Young Inventors Challenge website.

Evaluation Strategies

As outlined in the description above for Session Four, there will be a group discussion at the end of the last session where participants will reflect and self-evaluate their work. Presenters can evaluate the success of the program based on the conversation during Session Four when participants share what they learned. Presenters can also ask for feedback from participants about

the program (what went well, what would they change/add/remove). An online form could be utilized to collect and store feedback data.

Handouts/Links for Participants

Worksheet/Design Journal: *Quick Game Design Workshop* from MIT edX: Introduction to Game Design & Institute of Play (Available on Kathleen Mercury's "[Teaching Resources](#)" page, listed as "Prototyping a 10 Minute Game," the second listing under "Before we design games, we play a lot of games and talk about them.")

[Young Inventor Resources](#): Chicago Toy & Game Group lists several resources for students who are designing games

ANNOTATED BIBLIOGRAPHY

Non-fiction/Informational Resources for Presenters

Books on Board Games

Hinebaugh, Jeffrey P. *A Board Game Education*. 2009. 188pgs. Rowman & Littlefield Education. \$89.00. (9781607092599).

Hinebaugh, a practicing attorney, is a lifelong board gamer who conducted research on the educational benefits of board games. This book includes his background story; an overview of board game history; educational theories; use of board games in educational curriculum; and sections that tie specific games to the subjects of social science, language arts, economics, logic and deductive reasoning, strategy and negotiation, creative thinking and communication, and mathematics. There are photos of games throughout the book. The end of the book contains a list of the author's references and resources for further reading. This book was also followed up with a second title: [More Board Game Education: Inspiring Students Through Board Games](#). ([Book on WorldCat](#))

Mayer, Brian, and Christopher Harris. *Libraries Got Game: Aligned Learning through Modern Board Games*. 2010. 144pgs. American Library Association. \$46.00. (9780838910092)

Mayer is a library technology specialist and Harris is a school library system coordinator. Both focus on the use of board games in education curricula. This book introduces modern board games, explains why games matter, and ties games to twenty-first century skills, as well as state and national curriculum standards. Specific examples of educational models used in libraries are provided, as well as information on how to build a game collection for educational purposes in a library setting. The last sections of the book include a useful glossary of board game terminology, a list of games discussed throughout the book, a list of games publishers, and an index to search the book by topic. While some of the examples focus on K-12 libraries, this book is valuable for public libraries, as well. ([Book on WorldCat](#))

Websites on Board Games

Chicago Toy & Games Group – Young Inventor Challenge. Free.

<https://www.chitag.com/yiceducatorinfo>

The Chicago Toy & Games Group (ChiTAG) runs an annual fair that showcases new toys and games, as well as game designers, publishers, and educational organizations. Part of the fair includes the Young Inventors Challenge (YIC), in which kids and teens submit their design prototypes for toys and games. The winner of the challenge will have their toy/game professionally produced for the retail market. The YIC page includes [resources for educators](#) who want to run YIC workshops in order to teach kids and teens to design toys and games.

Kathleen Mercury: Resources to Teach Strategy Game Design. Free.

<https://www.kathleenmercury.com/>

Kathleen Mercury is a middle school teacher in the St. Louis, MO area who has been teaching game design to teens for over 10 years. Her website is an invaluable resource for teachers, librarians, and other educators. One of the most useful sections for this program is “[My Teaching Resources](#),” which includes descriptive links to articles on her site about all aspects of teaching board game design: playing and talking about games, the design process and gaming terminology, and design requirements set for her students. She includes her rationale for teaching game design and using games for education, as well as information on how to run a game club, where to find more resources, and links to examples of games made by her students.

Non-fiction/Informational Resources for Participants

Books on Climate Change

Hudak, Heather C. *Climate Change (Get Informed-Stay Informed)*. 2018. 45pgs. Crabtree Publishing Company. \$9.95. (9780778749707).

This book is part of the “Get Informed-Stay Informed” series targeted at middle grade youth. It is filled with images and infographics. This book is easy to browse through and ideal for the Explore phase of this program because it is quick and easy to use. The book addresses multiple viewpoints and encourages readers to search for new at various levels (local, state, national, global). The author has written several books for kids and teens on environmental and civil topics. ([Book on WorldCat](#))

Websites on Climate Change

NASA: *Global Climate Change*. Free. <https://climate.nasa.gov/>

This website is put together by the National Aeronautics and Space Administration (NASA), an independent agency of the United States Federal Government. It contains data, articles, and other resources on global climate change. The “Explore” section of the website includes interactive maps, image galleries, apps, and videos. The “Facts” section includes evidence, causes, effects, scientific consensus, vital signs, and frequently asked questions. The website is exploratory in nature, allowing the user to navigate to points of interest and find information or interactive modules. Graphic images are used widely throughout the site.

United Nations Environment Programme: Climate Change. Free.
<https://www.unenvironment.org/explore-topics/climate-change>

This website is maintained by the United Nations, a global, intergovernmental organization whose member states collaborate address mutual challenges and responsibilities to promote peace. The Environment Programme website features climate change as an “explore topic” with data and articles available for perusal. There is also information about how to get involved to address climate change.

Books on Board Game Design

Selinker, Mike. *The Kobold Guide to Board Game Design*. 2011. 138pgs. Open Design, LLC. \$19.99. (9781936781041).

[Mike Selinker](#) is an award winning game designer and his book was the winner of the [2011 Origins Award for Best Game Related Publication](#). The book features essays on game design by Selinker, as well as other prominent game designers. The book is broken up into four sections: Concepting, Design, Development, and Presentation, with multiple essay chapters in each section. Topics include everything from initial concept to game publication, including writing rules and making prototypes. The writing style is accessible to game enthusiasts as well as aspiring designers. ([Book on WorldCat](#))

Website on Board Game Design

Kathleen Mercury: Resources to Teach Strategy Game Design – Student Game Examples. Free. <https://www.kathleenmercury.com/student-game-examples.html>

Kathleen Mercury is a middle school teacher in the St. Louis, MO area who has been teaching game design to teens for over 10 years. Her website contains many board game design resources, but this page featuring links to games that her students have designed is of particular use to teens. The page links to each session she has taught (currently 16 sessions) where students share the games they have designed to a public forum for discussion and feedback. The conversations about these designs are useful to other students doing game design because many of the comments are from professional game designers or board game hobby enthusiasts.

Image Credits

Header image

Macdonald, Diane. “Miscellaneous Board Game Pieces on a Chess Board.” Canva, www.canva.com/media/MADer1L13bo.

Teen marketing example

Designed by Rebecca Strang in Canva with the following background photo

Talaj. “Board game concept.” Canva, <https://www.canva.com/media/MADer7HWbF8>.

Parent/Educator marketing example

Designed by Rebecca Strang in Canva with the following background photo

Wittayayut. “STEM concept with drawing background. Magnifying glass over education background.” Canva, <https://www.canva.com/media/MADasG323HI>.

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