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SCIBORG:

The science literacy board game: a new tool for improving science literacy with informal youth education

Trainer's Guide

Project Reference: 2023-3-AT01-KA210-YOU-000179226

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The SCIBORG board game

Trainer's Guide, 2024

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The images produced for the materials of this Rulebook and the board game were AI-generated images and art with a text prompt using Canva's AI photo generator apps.

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Introduction to the Guide

This document is addressed to the **trainers and institutions of youth, universities and organizations in the fields of science**, aiding them in promoting science literacy via the use of an entertaining game.

This document aims to **explain the concepts behind the game's rules, and to provide insight and practical advice** on its uses within the various target groups (including team-building exercises or ice-breaker activities for new groups).

Some of the information given below is common in the game creation processes of Dracon RDS, such as the simpler yet necessary cut and assemble instructions.

The majority of the document contains information that is specifically tied to this project (such as the game modes and educational/theoretical part).

Getting Ready

Before playing for the first time, a small amount of preparation is necessary, so that the trainer can be accustomed to the game's components and concepts.

01 **Download and print the game's token and card files,** in single-page printing, and borrow a 6-sided dice from another game.

02 **Cut the components carefully using their outline**, or preferably the cut guide symbols (especially if you intend to use sleeves).

- For sturdier card set-up, we recommend that board game sleeves and cards are used; any game store selling market-popular card games will be able to accommodate the needs in sleeves, and often they can supply cards they do not need (such as Magic: the Gathering Lands and Commons) that can be used as supporting structure, otherwise any playing card would do (the cards have been designed for **card/sleeve size: 63,5*88mm**).
- Should a better print/cut quality be needed, many medium and large printing companies offer to print and machine-cut the A4-paper cards at reasonable prices.
- If you prefer, you can print the cards in sticker paper and use waste material such as cereal boxes as a base to stick the cards on.
- As a last resort, we recommend printing the cards on thicker paper, although simple A4 would do.

03 Finally, cut any tokens carefully; we recommend that they are either printed in hard-paper, or sticker paper and subsequently stuck on a sturdier material (we recommend using material that would be trashed, such as cereal boxes, cartons etc).

- Alternatively, you can use beads or other easy items in your possession to replace the tokens.

After doing the preparatory steps, the trainer will proceed to read the game's rules, and watch the short how-to-play video. We recommend that the rulebook is read first, followed by the video which will clarify the way of play via example.

Educational Aspect & Trainer's Role

In order to maximize the impact, the presence of a Trainer further promotes the discussions occurring after each Research Phase. As such, the trainer helps the game to steer away from the majority of simple games created in educational context; it promotes critical thinking and rationalization, as well as envisioning the route a researcher takes to produce their findings.

To support this educational approach, the game incorporates different types of cards, each designed to stimulate discussion, strategy, and learning in unique ways.

Research Cards

These cards are the cards used by the players to create their research chains. They are prompts to research activities that could be conducted.

Chance Cards

These cards emulate random conditions or situations that could occur, and are included to add a level of luck in the game, ensuring its replayability.

Bonus Cards

These cards serve as initial guidelines for the player's strategy, indicating how they can collect additional points.

Character Cards

These cards represent fictional characters (Researchers), each belonging to a different field. They are used to either personalize a bit more the players' game, or to add to the strategic aspect by providing an additional ability (advanced side).

The Trainer's Role

The trainer is a crucial part of the educational process of this game-tool; as it is meant to be used in the context of education, a versed trainer is at the heart of the game, instigating discussions and managing its flow.

The trainer will dictate the pace (faster or slower), will ask further questions on the played cards if needed, will help the players with prompts in order to aid them in the discussions and their presentation of their conducted research story.

The trainer will also be able to modify the base game rules to better accommodate their needs, simplifying or enhancing the rule-set, or creating new cards to be used in the game's confines.

The game is designed to offer a fun and engaging time for the participants, allowing them to experience an actual game while at the same time learning and enhancing their critical thinking skills and their understanding of what the research process is and thus gain a stronger foothold in comprehending Science Literacy.

However, while its mechanics allow for a trainer-free gaming experience, the trainer is the key to promote the educational aspect and elevate the game to its true potential as a tool.

Further Steps

The next part offers **modifications or advice for the trainer**, so that they can **unlock the game-tool's full potential** and modify it according to their educational needs, and the needs of their group.

We recommend that the **next part is read after the first test-playthrough**.

Advanced Trainer's Guide

The next part of this document contains **two parts:**

- simple **practical advice** for the trainer,
- **alternate game modes** and rules modifications.

Practical Advice

A part of the Guide includes common advice given to all games created by the participation of Dracon RDS, as they reflect general topics that must be mentioned, in addition to the project specific advice.

During the course of the game, it is easy for the players to lose themselves in the moment as they enjoy their participation. The trainer should be present to monitor the group's progress, and keep them on track of the educational aspect of the game. Basic advice are indicated below:

Clean components and venue

This may seem obvious, but the game components should be kept in a neat and tidy way, to be inviting to the players and offer them a good participating experience. The venue should also have good acoustics and ample light, and the space should allow "round" sitting allocation with a playing surface in the middle.

Know the rules

Prior to initiating the game with the learners, the trainer should ensure they know the rules themselves and are acquainted with the game's components. In the opposite case, loss of interest will be incurred to the participants.

Keep the group on track

Provide prompts, nods or quick comments frequently to help the group stay on track. For example, quick questions like "how do you think that this action benefits your research", remind the players to present their topics and make up their story.

Keep the group motivated

Remind the players of their need to pay attention to the active players and ask them questions; the game aims to promote participation, so the trainer should verbally invite the players to participate, and/or break the game's rules and award points for cases not mentioned in the rules as they see fit.

Feel your group's "vibe"

Not all people enjoy the same kind of games. Some would prefer more discussion, others more strategy, others more fun. Always know your group, and modify the game to their needs; examples of alternate modes can be found later on in this document.

Don't be afraid of change

The game is a tool more than a game. Do not be afraid to break its rules, to better serve your purposes. If a rule does not suit you, or hinders your progress, change it!

Put the Role in the Playing

The game is better used after a session providing information on a topic of science literacy or the scientific method. How would you build your own research? What do you need for a good hypothesis, experiment, or conclusion? What is your favorite topic in research? What are the steps they would take in order to find the right answers? These questions are a good introduction to the game, to ease the players into their Roles as Scientific Researchers.

Alternate game modes

The game can be altered in many ways regarding its gameplay, so that it can serve the trainer's and the group's needs. Herein are some examples of alternate game modes, which can be used as they are presented, or serve as sparks to the trainer's creativity.

Extra Points

The trainer can distribute additional points for precise commenting, innovation, out-of-the-box thinking etc. For example, trainers can award extra points for using all the "components" of the phase in their research story or for connecting your stories between the phases. There is no limit, as long as your players know they can gain extra points based on that. It is highly recommended that these points are noted in a private paper by the trainer and distributed collectively at the end of each Phase so the players do not second-guess the trainer's award system.

Fifth Player

While the game intentionally leaves a number of cards out of use, there is nothing stopping you from adding that extra player! Just deal all the decks of that Phase instead of returning one in the box, and print an extra player board.

Ease-it-Up!

The game aims to help the participants evolve their critical thinking skills and begin their understanding of the Research Process and their engagement with Civic Science. Some players may be beginners or shyer than others; it is thus recommended that if your group belongs to these categories, you remove scoring and points, and simply play the game promoting the feeling of exploration as the players make up their stories and read their cards, at least for the first game, introducing the scoring and point allocation parts later – Character cards, Bonus cards and Chance cards do not need to be used in this case.

Fixed Cards

The trainer may decide they want one, any or all decks of cards to be set in a specific way, to ensure that the players get a "good set of cards". The trainer can skip the drafting process and instead deal specific sets of cards to each player, or can even provide a specific starting set of 3 cards per player and allow them to draft the others.

Timed or Not

A timer can be used to promote quick thinking and risk-taking. The trainer should feel free to introduce time limitations, and reduce or increase the time allocated to each player.

Mot(ivat)ion

Some groups prefer more energetic games, where they would be able to also expend physical energy. Including rules such as “while telling your story, you must walk around the group, and you must finish and sit at the same time”, or giving extra points for speakers who utilize hand motions, or give extra points for passionate standing role-playing for their research, are examples of energetic changes that could be applied.

Babel

In modern multicultural environments, it is easy for people to feel uncomfortable when being unable to formulate their speech in a foreign language. Allow them the window to express themselves in a language they are comfortable with and the help of their friends in translation.

Additional Cards

Each and every card of the game is replaceable; especially if you wish to present a topic that is not used in our example cards. Make sure you make a matching title and flavor text (if any) to enrich the players’ experience.

If you are experienced in game design, feel free to alter the card rules/abilities too! However, we recommend you keep our selection of symbols and quantities of appearance in order to have a balanced play and not accidentally create “common/rare” card situations.

Common Board and Tokens

During our initial steps, we had seen that some players prefer to see points scored in a mutual board; while the recommended way of playing is with the score sheet, a score board and tokens for a 4-player game are included in the files. Feel free to use any item in your disposal (such as decorative colored cubes or beads) for tokens instead of printing our set.

Expand the research story

The research story can take whatever form you or your group wants. The trainer can set criteria for how the stories should be evaluated depending on the group and the difficulty desired.

For example, full points are awarded if the players use the names for all the components in their story (e.g. finding collaborators, searching databases, presenting at conferences…) or for how well they connect the different topics in their chains.

For more informal environments you can even vote for who makes up the best story. In environments where the students need more guidance, you can even give the players a sentence to start their story with (e.g. "In order to build my hypothesis I… talked to other researchers… etc). The possibilities are limitless!

The theory behind the game

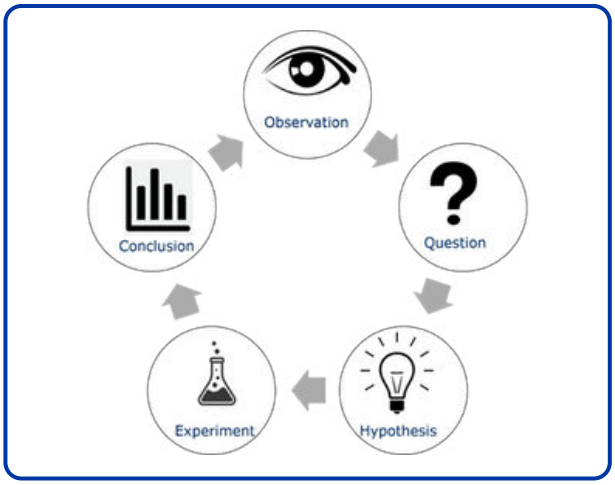
This section contains additional information on science literacy that were relevant and guided the consortium's efforts, leading to the creation of the final game.

→ The project's scope

Introduction: What is science literacy?

Science literacy is the understanding of how scientific knowledge is created. This skill is critically important for the public.

It gives people the tools to better understand how scientific knowledge is generated and why it may change over time, enabling them to critically assess what is presented in the media.



The scientific method (is a central pillar of science literacy, as most scientific disciplines rely on this method.

01 The first step is observation where the scientist observes something in their environment (i.e.: the river in my city is flooding over the banks).

02 Next, they develop a question based on this observation (i.e. what causes the river to flood over its banks?).

03 Then, they look into existing knowledge and generate a hypothesis based on this question (i.e. heavy rain events cause the river to flood).

04 Next they collect and analyze data to answer their question (i.e. measure how much it rains and when the river floods over the banks).

05 Finally, they report their conclusions (i.e. when it rains X amount, the river floods over its banks) and this leads into further observations/questions (i.e. what happens when it rains a small amount, for a long amount of time? How does this change with the city growing?).

This process is iterative and builds upon itself. Each step contains many challenges that researchers must face.

The better people understand the scientific method, the better able they are to understand the complexities behind generating scientific information.

Target Groups

The target group is young people who already like to play board games in their free time and who may or may not be interested in science. The main target groups of this project are youth and youth educators, active with learners aged 16-24. Youth in the public sphere are targeted since board games are a common way to spend free time and can be used by individual learners (i.e. the game could be played with friends during a game night or at family dinner). Therefore, this game should be designed to be played in a casual and informal setting.

Objectives

The overall objective of the board game is to provide a fun way to increase young people's understanding of the scientific method and therefore increase their scientific literacy.

Emotional Outcomes: What do we want the target group to feel?

It is important to identify the "feeling" or emotion we want the players to have during or after playing the game.
To this end, we send out a survey to our wider scientific community asking "How do we want the public to feel about research?"

Based on these responses we identified two targets emotions:

- Curious: We want the game to spark interest and make the players feel curious about research and science
- Empowered: We want the research process to feel more accessible. Players should feel empowered that they can understand scientific information.

Learning outcomes: What do we want the target group to learn?

Based on the project outcomes and the stated objectives, we have identified two learning outcomes:

- The players should understand the basic structure of the scientific method. They should also have some understanding of the ups and downs associated with generating research based knowledge. This objective will be achieved through the board game mechanics.
- The players should understand that the scientific method applies to almost all fields of research. This objective will be achieved through the board game theming.

Board Game Concept

When initially discussing the game, several ideas were brought on the table. The one that was more prominent and would be our final game, is presented here, to lead the trainer through the understanding of the underlying ideas and concepts.

The group visited board game websites and databases such as BoardGameGeek, where examples of all sorts of games can be seen, and mechanics and other structural details can be understood. That led the group to a common understanding of the terminology, and thus the game creation process.

There were a few mechanics that were popular amongst the group, as listed below:

Game Mechanic: Set Collection

Set collection is a game mechanic where players are trying to collect a specific set of cards. In this context, we proposed that players use card collection to "build" their research.

They will select cards that help them gain points and/or achieve certain tasks to have stronger research than their opponents. Players will place the cards on their player boards. This focuses the player on their own "research" (card set) and making their own set stronger, instead of taking cards away from or attacking their opponents.

In research, the priority is not attacking other researchers but producing the strongest research possible yourself. This should be reflective in the game.

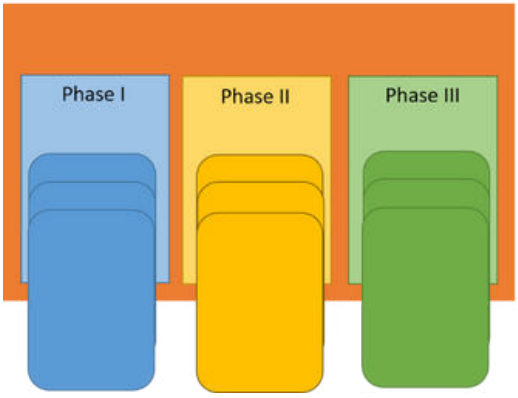
Game Mechanic: Three Phases

Board games can have multiple phases or rounds. We proposed that we use this mechanic to emulate different aspects of the scientific method. This is beneficial for several reasons

First, it allows for different decks of cards for each phase. Since the challenges and pitfalls of each step can be very different from each other, this allows for the higher specificity in each step.

Second, it illustrates that, while all steps of the scientific method have to be adequate to produce good research (e.g. win the game), the players can still succeed if they get more points in one phase and not so many in another.

In terms of the different decks, we wanted to add elements that can enhance or negatively impact your research.



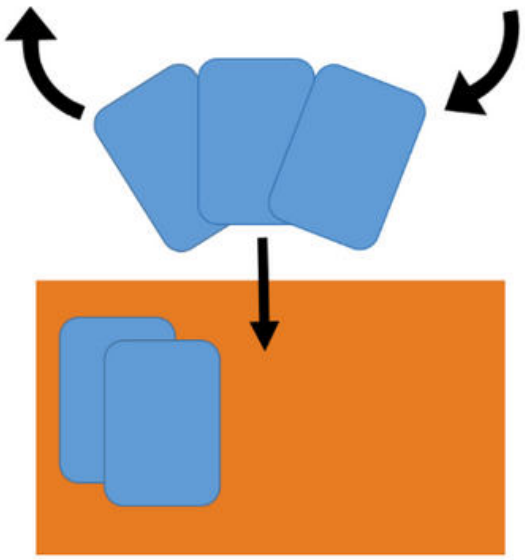
Game Mechanic: Drafting

Drafting is a game mechanic where each player is dealt a specific number of cards. Each player chooses a card from their hand and then passes the rest to the next player, simultaneously.

Meanwhile they receive a deck from another player. They choose and pass the cards until there are none left. This is an appropriate mechanism for our game as it allows for both strategy and chance.

The player has to strategically pick cards that help them the most from the ones available. This might change as they have fewer to pick from or as the other players pick their cards.

This variability also makes the game fun through multiple plays (i.e. you might need to have different strategies in different games with different participants).



Game Mechanic: Variable Player Powers

Another game mechanic that would help achieve our objectives is variable player powers. This is when not every player has exactly the same rules. This can be simple or very complex.

We proposed a simple variation between the different players or "scientists" for two reasons. First, it is another opportunity to highlight the different scientific fields that use the scientific method. Second, we hope that it would excite the players to play the game more than once.

Game theme

The second learning objective states that the players should understand that the scientific method can apply to most different fields of research.

Therefore, we proposed that we use the game theming to create characters/different scientists that have variable player powers. These scientists will be reflected on the player boards or separate cards, and will also contain extra information and/or QR codes about this field of science/scientist.

Testing and... Conclusion!

The game was **tested internally by the Consortium**, and was also tested in **external group events**. One of the events held was a mobility event within the project's scope, where members of the organizations met physically to test the game and proceed to make practical changes and improvements.

Additionally, it was **presented in conferences, conventions and exhibitions** with exceedingly positive feedback, and the consortium moved on to producing the files you now have in your hands.

We hope that you **enjoy the game and the process as much as we did**, as we believe this project will aid you in your quest to **entice the younger generations in engaging the topic of Science in a playful and enjoyable manner**.

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Thank you for exploring the SCIBORG board game! We hope you enjoy diving into the world of science, critical thinking, and discovery through play.

For any further information, feedback, or support, please don't hesitate to reach out to us.

Contact us:

@sciborgproject

SCIBORG is made possible through the collaboration of our dedicated partners:

- **WasserCluster Lunz** (Austria) – Scientific Partner
- **Dracon Rules Design Studio** (Greece) – Game Design Partner
- **Asociatia Share Education** (Romania) – Educational Partner

Project coordinator

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