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# Raising Awareness of Open Access through Game-Based Learning

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Samaneh Borji is an independent researcher. In 2020, she received a master's degree in *Knowledge and Information Science* from Shahid Beheshti University. After earning an award as one of the top young Iranian early career researchers for her master's thesis, she opted to continue her fascinating research adventure. Her work focuses specifically on the application of technologies in the field of information science. Her favorite place to study and conduct research is libraries, where human science and knowledge have flourished.

Scholars require access to relevant academic material to further the growth of knowledge. Today, the preferred way of access is to download a digital copy and read it directly from the screen or as a printout. As literature becomes increasingly interdisciplinary, global, and digital, it also becomes more expensive; costs are concealed behind technical barriers and license constraints (Bailey 2). To facilitate access to articles without any restrictions posed by subscriptions, many researchers and scholars are taking steps to make their work available online digitally, and free of most copyright and license limitations (Suber 4). This is commonly referred to as Open Access (OA). OA is already having a major positive effect on the accessibility of scientific journal literature (Björk et al. 2). Nevertheless, the potentials of OA are not yet widely used (Siler and Frenken 29), in large part due to a lack of awareness. The implications of OA and its publishing models are still unknown among some academic scholars (Emojorho et al. 3; Rafiq and Sultan 2; Rodriguez 605). Authors who have not previously published in an OA journal attributed this to various reasons, most common being a lack of familiarity with such publications and the benefits of OA publishing (Swan and Brown 220). In contrast, faculty members who have a high level of awareness or use of OA perceived it positively (Kaba and Said 95). Open Access awareness and expertise could be increased through ongoing advocacy programs and training (Kassahun and Nsala 10). Additionally, training and online courses can assist researchers in overcoming obstacles associated with the use of OA resources (Bala et al. 139).

Certain educational institutions and universities have taken a bold, courageous, and curious approach to increase engagement in OA training by developing educational OA-themed Games (OAGs). These games were developed to raise awareness and teach the concepts of openness and OA, resulting in great engagement from students, academic staff, and professional services staff (Sundsbo 5). The OAGs have provided a positive environment for conversations around OA (Hoffner et al. 424). Moreover, it is expected that these games will create incentives for scientists to engage with OA (Mazarakis and Bräuer 62).

It is suggested in this study that using OAGs as a tool in educational centers, notably in universities and academic libraries, is an effective teaching strategy. In addition to outlining the various efforts and nine connected games, it identifies and discusses the presently available OAGs in the world. Following that, the OAGs' features will be identified using a checklist developed in accordance with the game-based learning model (GBL model).

### OA-Themed Games

The author found nine games developed to teach players the concept of OA. There are two kinds of OAGs – physical games and online games. The materials of physical games, such as cards, boards, rules, and pictures, are available as PDF, PowerPoint, and Word files to be downloaded and printed by users. The online games are played virtually, and players must visit the websites. Some OAGs also aim to teach many other research-related themes. The studied games with their types and themes are shown in Table 1.

**Table 1** Educational Games which teach Open Access

Name	Type	Themes
Academia: Bioscience Edition	Physical	Open Access; Research methods
Creative Commons Card Game	Physical	Open licenses
Game of Open Access	Physical	Open Access
Impact Game	Physical	Data; Impact; Open Access
Open Access Escape Room	Both	Open Access
Open Access Mystery	Online	Open Access
Open Axis: The Open Access Video Game	Online	Open Access
Publishing Trap	Both	Authorship; Copyright; Data; Impact; Open Access; Open licenses
Researchers, Impact, and Publications (R.I.P.)	Physical	Data; Impact; Open Access

## 1 *Academia: Bioscience Edition*

In the game *Academia: Bioscience Edition*, players must collaborate with their fellow scientists to create a cancer cure. This game is designed to teach about OA by introducing some generalities and more specific conditions about OA processes. This game is also a resource that covers information related to carrying out research more generally, such as teaching research methods. To do so, they must collaborate to investigate and publish at least five key ideas. Idea cards, rules cards, events cards, tool cards, OA cards, restricted access tokens, and player actions cards are among the seven cards and tokens available on Figma (“*Academia: Bioscience Edition*”). There is also a printable game deck that users can utilize.

The player must turn over their next event card and resolve the challenge immediately at the start of their turn. After that, the player can take up to four actions before passing the baton clockwise to the next player. Players can select from two or more activity types, such as *ponder*, *research*, *publish*, *learn*, *teach*, and *collaborate*. A player is considered to have access to a research output if they either researched and published it themselves or if one of the other players did. Due to role or event limits, even if the output has been published with restricted access, some players may still be unable to access it.

## 2 *Creative Commons Card Game*

Cambridge University Libraries came up with the idea of the *Creative Commons Card Game*. Simple cards in this game allow educators to introduce the concept of creating a Creative Commons license to students. It also allows them to consider what the various components of license types signify and how they may be combined to produce a custom license. Individuals or small groups can play the cards, and the game can be competitive or just for fun. The game can be played using any materials; however, the instructions include several examples and copies of the cards to print in a *PowerPoint* file (“*Creative Commons Card Game*”).

Instructors must first print and cut out as many sets of *Creative Commons Cards* as they require for their students. Then they must provide learners with an example resource (for example, a photograph or a presentation) to which a license should be attached. Then they must define the usage they want to allow/prohibit and invite learners to generate a license using the cards. When students have completed the course, instructors show them a genuine license. If learners have questions regarding the licenses and how they are put together, this can be utilized to start a discussion.

### 3 *Game of Open Access*

The *Game of Open Access* is a board game created by workers from the University of Huddersfield's Computing and Library Services. The goal is to familiarize researchers with the main ideas and tools needed to comply with OA requirements. It seeks to create an awareness of the function of OA from the original concept for an article through its acceptance for publishing through the use of creative learning. The game comprises three files: the *Game Board*, a deck of cards, and the *Rules*, which are available on the University of Huddersfield's website ("The Game of Open Access"). In this game, players must throw the dice to move their playing piece around the board, following the instructions. If they answer the question correctly, they may keep the card. When two or more players are playing, all players must reach the end and publish their article before the game is complete. Then, they take an OA card whenever they land on the relevant spaces. If they answer the question incorrectly, they must return the card to the bottom of the pile. The winner is the person with the most OA cards, not the first to publish their article.

During the University of Antwerp's *OA Week 2021*, a group of students organized an *OA Student Event*. The project's objective was to increase student knowledge of OA and *Open Science* conversations and practices. To enhance the enjoyment of this experience, they customized previous versions of *The Game of Open Access* for the University of Antwerp's event. They made the customized game's digital assets available through

Zenodo (“Open Access Student Event – The game of Open Access”), in anticipation of other institutions being interested in repurposing and altering them for use in various contexts. Promisingly, the game has been translated into French by the University of Lille and enriched by the University of Réunion. It has also been adapted to the Belgian context by the Libraries of the ULB (van Nieuwerburgh).

#### 4 *Impact Game*

*The Impact Game* is inspired by *Snakes and Ladders* and created by Cranfield University. Participants compete to be the first to reach the end of the game board, answering questions and discussing things like research data management, research impact, and OA. Materials relating to the game are available on Figshare (“The Impact Game”).

#### 5 *Open Access Escape Room*

*Physical Version:* The University of Essex designed this OA-themed escape room, the *Open Access Escape Room*. Instructors will find all they need to set up their own *OA Escape Room* in a project published on Figshare (“Open Access Escape Room”). The instructions provide a general overview of how the game works. The script instructs the host and villain on how to interact with the audience. The *PowerPoint Timer* and *Hints* feature a countdown timer and a clue system to assist players. The layout provides a visual representation of the puzzles. Finally, downloadable components and props have been supplied to make the game as simple to develop as feasible. However, there will be some objects that the escape room instructions will need to make, buy, or borrow in order to put up.

*Online Version:* *Hunt for Open Access* is the name of the online version of this game (“The puzzling hunt for Open Access”). Players will appear in the future – 2120 – and all research will be freely available to readers and authors. *Diamond OA* is the term for this. It was different in 2020 because

making research freely available may be costly or time-consuming. As an advocate for OA, the player must lend a hand. A villain has sequestered all research at the University of Essex and has threatened to sequester all research worldwide. The player's goal is to stop them, unlock the research, and restore access to everything. According to legend, there are two ways to reopen everything: the *Green* and the *Gold Routes*. Before they can start uncovering the research, the players must first solve the clues for both pathways.

## 6 *Open Access Mystery*

The University of Essex developed the *Open Access Mystery* to connect colleagues, friends, and strangers through an online role-playing mystery game during the COVID-19 pandemic period in 2020, when many conferences and networking opportunities were postponed or canceled. This game was created for virtual play via *Zoom*, *Skype*, *Microsoft Teams*, or other such online platforms. The *Open Access Mystery* chronicles the encounters of eight very diverse persons at a symposium. During the conference, calamity strikes, and it is up to the players to determine who is responsible for what turns out to be a global lockdown on all research. While solving this mystery, the player becomes familiar with the concepts related to OA, as well as its obstacles and benefits. The contents supplied will include everything necessary for players to create their own *OA Mystery*, including character packs and a host information bundle (“Open Access Mystery”).

## 7 *Open Axis: The Open Access Video Game*

The librarians of the University of UCLA invented *Open Axis: The Open Access Video Game*, a *choose-your-own-adventure* game. The players take on the role of a scholar navigating the world of research and scholarly publishing. They click on various links to progress as they make decisions.

Within the adventure, there are several distinct sorts of 2D platformer minigames. The game's goal is to teach players how to engage with open research techniques in various ways, highlighting best practices and further resources. The game is available online on the website ("Open Axis: The Open Access Video Game").

## 8 Publishing Trap

*Physical Version:* The *Publishing Trap* is a board game developed by the UK Copyright Literacy team that enables participants to examine the consequences of their academic communication decisions and debate the significance of OA in research ("The Publishing Trap"). The game is about intellectual communication and research distribution in higher education. It chronicles the academic careers of four characters, who are confronted with various circumstances at various stages of their careers, from *Ph.D. Submission* through *Professorship*. The characters choose how to distribute their research through conferences, academic journals, monographs, and textbooks. The game teaches researchers how money, intellectual property rights, and open and closed publishing methods affect their research's diffusion and impact. By teaming up to play the game, players can discuss the consequences of each character's choices. The game concludes at the end of the character's life when players realize their choices' financial, intellectual, and social ramifications.

*Online Version:* The game is a team game in which up to 24 participants compete in up to four teams. It retains many of the original board game's characteristics, with the exception of the board. It is intended to be used in conjunction with a virtual classroom program that has break-out room features. This simulates the team talks that would have occurred as players gathered around the board to make character-related decisions. *Publishing Trap Online* is available to download ("The Publishing Trap Online").

## 9 Researchers, Impact, and Publications (R.I.P.)

*Researchers, Impact, and Publication* was created by the University of Bristol. Based on *Cards Against Humanity*, this game tries to teach players about various research-related subjects, such as OA, through a humorous approach. The game can be played with as few as four players and as many as eight. There is no upper limit, but it is most enjoyable with six to eight players. For the group, each player reads aloud their card combination. Players should be prepared to justify or explain their decisions, whether appropriate or improper. The *Card Czar* then chooses their favorite play and awards one *Awesome Point* to the person who submitted it. The game materials are available on the university's website ("Researchers, Impact & Publications (R.I.P) Game data (01-2020)").

### GBL Model Factors in the OAGs

In this part, the studied OAGs are categorized according to their features, based on a GBL model proposed by Shi and Shih (5). Their study, entitled "Game factors and game-based learning design model," extracted primary and essential factors affecting the design of an educational game, and divided them into four main factors and their components based on their importance and relationships:

- 1 **Goals:** Learning goals turn into game goals after designing the game. All OAGs aim to teach OA and other research-related themes (shown in Table 1).
- 2 **Mechanism:** Katsarov et al. defines the mechanism as follows: players' choices and actions, roles, perspectives, goals, feedback, rewards, and probable consequences (347). The OAGs' mechanisms are categorized in Table 2.

**Table 2** Categorizing the OAGs according to their mechanism

Mechanism	Name
Snakes and Ladders	- Impact Game
Card	- Academia: Bioscience Edition - Creative Commons Card Game - Researchers, Impact, and Publications (R.I.P.)
Board Game	- Game of Open Access - Publishing Trap
Escape Room	- Open Access Escape Room
Adventure and Mystery	- Open Axis: The Open Access Video Game - Open Access Mystery

- **Interaction** involves any type of communication during the game, from the user interface to monitoring the character (Coutinho et al. 1). Generally, each OAG has its unique interactions; for example, in the Open Access Mystery game, players virtually interact through an online role-playing mystery game via online platforms.
  - **Freedom:** It refers to the player’s access to different game parts (Wilson et al. 217). Some OAGs were presented as an open education resource (OER), meaning they can be edited and personalized according to the (educational) needs of the user.
- 3 Fantasy:** The use of fantasy in games has several benefits; it provides users with a unique environment in which it is safe to experience and explore a decision’s consequences (Garris et al. 448). For example, in some of the studied games, users’ access to research in the world is blocked imaginatively.
- **Narration:** Juul specified this as a story including game characteristics, existents, situations, and actions. For example, in *The Puzzling Hunt for Open Access*, the game’s story takes place in the future; 2120. A villain locks all the research at the University of Essex and threatens to lock all of the research in the world. In this game, the user (a supporter of Open Access) must prevent the villain from carrying out their evil plan, and unlock the research and re-release access to the investigation.

- **Sensation:** The most common word used to refer to *sensation* is “simulation” (Kim). In *Open Axis: The Open Access Video Game*, at the stage where the user needs to collect resources, a library view is simulated in which the researcher collects resources by feeling the presence of a library while identifying the appropriate resources.
- 4 **Value:** The factors that motivate the user to start the game are *game value*. Achievements will be obtained despite the challenges facing the players and will eventually lead to rewards. For example, in *Game Impact*, participants compete with others and overcome challenges, trying to be the first to reach the endpoint. Players can reach the endpoint and be rewarded by answering questions regarding research data management, research impact, and free access as they follow the right path.
- **Challenges:** These are the obstacles the player confronts to achieve their goals (Denisova et al. 2511). For example, in *Open Axis: The Open Access Video Game*, a stage has been designed to acquaint the player with virtual communication methods using research help (librarians, professors, and facilitators). At this stage, the player must find a path, work through obstacles, and familiarize themselves with OA methods along the way. In some games, challenges have been designed to assess the knowledge and skills of the researcher, such as games in which the player can progress by answering questions in the field of OA.
  - **Sociality:** The social behavior within a game is divided into *communication*, *cooperation*, *competition*, and *conflict*. Existing OAGs can be played both in groups and individually (some allow for either option).
  - **Mystery:** The game arouses curiosity and encourages exploration by the player. This is mentioned as an essential but unnecessary component in the GBL model. This factor is present in some OAGs, particularly games with escape room mechanisms. According to the GBL model, each OAG was explored and evaluated to determine the game’s status concerning the factors and their components (Table 3).

**Table 3** The GBL factors and their components in the OAGs

Game Name	Components of the GBL Model							
	Goals	Mechanism		Fantasy		Value		
		Interaction	Freedom	Narrative	Sensation	Challenges	Sociality	Mystery
Academia: Bioscience Edition	✓	✓				✓	✓	✓
Creative Commons Card Game	✓	✓					✓	✓
Game of Open Access	✓	✓				✓	✓	✓
Impact Game	✓	✓				✓	✓	✓
Open Access Escape Room	✓	✓		✓				✓
Open Access Mystery	✓	✓		✓			✓	✓
Open Axis: The Open Access Video Game	✓	✓		✓	✓	✓		
Publishing Trap	✓	✓		✓		✓	✓	✓
Researchers, Impact, and Publications (R.I.P.)	✓	✓	✓			✓	✓	✓

## Conclusion

Open Access continues to have a considerable impact on the academic publishing landscape. Nonetheless, many scholars are unfamiliar with the concept of OA. Many educational institutions have taken a curious approach to raising awareness of OA by developing educational OAGs, resulting in great engagement. Identifying and categorizing the OAGs' features in this study provides a detailed picture of their meaningful role in the teaching process to educators and gives them a vivid idea of how to implement them better in university instruction modules. The findings also assist educators in designing educational modules and courses using OAGs and developing new OAGs using the presented checklist and analysis.

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