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CHAPTER 11

Examining Good-Game Design Mechanics that Enhance Student Motivation:
A Case Study of “The Research Race” Game

Ngoc-Yen Tran

Introduction
The Research Race (hereon referred to simply as The Race) is an active learning game played in one-shot information literacy sessions. It is an exercise that has students working together in teams to find answers and to locate materials in a friendly competition with their classmates, while also introducing them to the physical and digital spaces of the library. This chapter outlines how to play The Race and gives rationale for how The Race can enhance motivation through the use of good game design mechanics.
Development and Learning Outcomes

Inspired by a presentation seen at LOEX of the West,¹ I developed the first rendition of The Race²,³ for first-year seminar courses as a way to get students to actively explore the physical and online aspects of the library in a friendly competition. In this way, The Race embraces the ACRL Framework of Research as Inquiry because the instructors present students with questions and problems to solve; each question builds on skills acquired during the activity and the answers suggest additional lines of inquiry.

The goal of the session is to introduce first-year students in a seminar course to library resources, services, and spaces. Students who attend the session should be able to use the library website to locate library hours and research guides, search for a book and to find it on the library shelves, search and find an article using a library database, make an interlibrary loan request, and to identify ways to get help. The focus of the entire session is on bringing awareness and giving students hands-on experiences with library resources, services, and spaces. The structure and the content of the game allow for adaptations for different courses.

Lesson Preparation, Setup, and Gameplay

The Race can best be described as a combination of a scavenger hunt and a relay race. To play the game, students working in teams of three to five are given tasks on small sheets of paper that introduce them to the library’s resources, spaces, and services. These tasks (otherwise known as “legs” of The Race) are given out and completed in sequential order. In order to advance to the next leg of The Race, teams have to bring up their completed sheets of paper (and any additional requirements, such as a book or a picture) and check in with the librarian to make sure that they have answered the questions or completed the task correctly. The first team to complete all of the legs of The Race win a prize (though, everyone wins something).

The first pre-session task for the librarian is to create the legs of the race. Each leg consists of the questions that the teams need to answer, what tasks they need to complete, and what they need to bring up to complete the leg. Developing a version of The Race for the first time can take a couple of hours. However, once the parts have been created, updating them with different topics or requirements takes minimal time. I recommend printing the legs on different colored paper to help the instructor easily identify which step each team is working on during the game, especially in sessions where time is limited. Depending on the length of the session and the topics of the course, legs can be removed or added; however, the standard legs for an introductory
first-year seminar course are described here. An example of each leg can be found in Appendix 11A.

Leg 1: Finding basic information on the library’s website. In this leg of The Race, you can ask students to find answers to questions that can be found on the library’s website. Questions for this leg can include finding the library’s hours, finding your subject librarian, reserving a group study room, finding a research guide, etc. Generally, you will be able to fit in five to eight questions and students should be able to complete this first leg in about five to ten minutes.

Leg 2: Finding a book in the catalog and on the shelves. For this leg, give students a specific topic and a building map, then ask them to search the library catalog to identify a relevant book. You can task them (as a team) to locate it on the shelves and to bring it to the librarian. If the book title is acceptable, the team will progress to the next leg. This part can take a team ten to fifteen minutes to complete.

Leg 3: Searching a library database to find articles. This leg has two parts. First, give students a specific database to go to and specific terms to search, then asked to identify one relevant article. They will then write an APA or MLA citation for the article. In the second part, ask the teams to find an article for which they will need to make an interlibrary loan request. In this task, they need to identify the article, sign in to their interlibrary loan account, and take a photo of the interlibrary loan request page as evidence. This multi-part leg can be completed in fifteen to twenty-five minutes.

Leg 4: Getting help from a librarian. In this leg, task students with identifying the different ways they can get help from the library or the librarian. For institutions that have an instant messaging or texting service, the task can be to have students message the service while the librarian leading the session is signed-in to intercept these instant messages. This leg generally takes less than five minutes to complete and is often the last leg of The Race.

Depending on the course and the length of the session, you may want to create and add more legs. The additional legs can also be used as bonus round legs for teams that complete the required legs quickly. Examples include having the teams locate an encyclopedia to find an answer to a question, using the building map to visit various locations in the library and taking selfies as evidence, or searching more databases in order to familiarize themselves with them.

Other pre-session preparations include creating and having available a handout to give to students at the end with information they will need to know, printing legs and cutting them up (enough for everyone in the session), creating an answer sheet, gathering maps of the library building for each team, and buying or creating prizes. (I recommend a small prize, like candy, for everyone who participates in playing in the game, as well as a prize for the winner(s).)
Lesson Overview

Students can play the entire game in a fifty-minute one-shot but it can also be adapted (details below). In a typical instruction session, students are briefly introduced to the game and told the two rules: (1) they may not ask for external help and (2) every team member has to fill in each sheet of paper. Then, they can be formed into teams and asked to select a team name and a leader who will bring the completed tasks to the librarian. Once teams select a leader and present their team names, The Race begins with each team being given the first leg of the race, faced down. When a team believes that they have completed the leg, they bring all of the completed sheets from every team member to the librarian to check for correctness. If an answer is incorrect, or the book or article is not relevant to the topic, the team is asked to correct their mistake. Once they have all of the correct answers, they can advance to the next leg. The Race ends when all teams have completed every leg or when five minutes of the class session remain. Teams that finish early can begin searching for their assignment or work on bonus round legs to keep them occupied. The last five minutes of class are used for a short wrap-up where specific points are emphasized (such as interlibrary loan and subject librarian support) and to answer any remaining questions. Lastly, a handout with pertinent information is distributed and then small prizes are given out to the winning team(s) and candy for all participants.

Brief Review of Libraries and Educational Games

Using quest-based games; such as scavenger hunts, treasure hunts, and mysteries to solve for orientations or information literacy courses is not a new approach in libraries. With the adoption of course management systems such as Blackboard and Canvas, libraries have also integrated their games into them. One such example is Fresno State University’s HML-IQ game within Blackboard in which students have one task to complete per week for six weeks. With further technological developments such as smartphones, iPad, and other tablets, librarians have adjusted their pedagogical approaches to use these platforms. For example, Wells exposed students to the physical music collection through a QR code scavenger hunt activity. Likewise, at the University of California-Merced Libraries, librarians collaborated with affiliate groups to use the mobile platform SCVNGR to provide a game that had students completing a number of challenges within a twenty-five-mile radius.

Adapting games for library instruction has had mixed results in terms of student learning gains. Marcus and Beck compared a traditional librarian-led
tour to a self-guided treasure hunt and found through a questionnaire that students learned better using the self-guided tour.\textsuperscript{11} Wells’ QR code activity also had positive responses from students about whether or not the activity helped them get acquainted with library and library services.\textsuperscript{12} On the other hand, McCain concluded through a study of library literature and information found on college and university libraries’ websites that revealed conflicting views and effectiveness of library scavenger hunts.\textsuperscript{13} Bailin, a librarian at Lafayette College ran a library version of *The Hunger Games* competition (based on the books by Suzanne Collins) and found that afterward students said they would prefer traditional library tours instead.\textsuperscript{14} Nevertheless, games have and will continue to gain traction in higher education, especially if they are designed well because they can be used to motivate learners. The rest of this chapter gives rationale for how The Race uses good game design mechanics to enhance motivation.

**How The Race Motivates Students with Good Game-Design Mechanics**

**Goals, Feedback, and Progress Reports**

One aspect of good game design that motivates continued play and learning is clear and specific goals or objectives.\textsuperscript{15,16} In The Race, the goals are explicitly given to students; the teams know that in order to win the game, they need to successfully complete a number of tasks or legs and that these deal with aspects of using the library for information and research. To determine if a leg has been completed successfully, the teams are told what a completed leg entails and given directions to bring their completed sheets up to the librarian to check for correctness before moving to the next task. In receiving immediate feedback from the librarian, the teams know what they did correctly and what needs improvement.\textsuperscript{17} Not only are there goals, the teams are given a progress report of where they are in working toward their goal, an element that contributes to motivation and continued play. At the top of every leg, the teams are told which leg they are on and the total number of legs so that they can see how close they are to winning or completing the game.

**Incremental Challenges**

Designing a game that is at the appropriate level of challenge for the players is an important game design aspect for enhancing learner motivation.\textsuperscript{18} As you design the legs of The Race, you can keep the students’ skill levels and library knowledge in mind. Because first-year students are the target audience, clear
and detailed instructions for each leg of the race can ensure the teams are able to complete the tasks successfully. By having legs that are achievable and goal-driven, the teams are encouraged to continue playing the game and are more likely to be engaged in the learning; if the legs were overly difficult, they may choose to abandon the game completely and not learn what they need to know.

Having achievable goals and objectives that are designed to be at the level of the players does not mean that the game should be easy. Good game design mechanics also include incrementally challenging players in order to keep them engaged and learning. The legs of The Race can be ordered to increase in difficulty as the teams progress. For example, the first leg of The Race introduces the students to library basics, but as the groups progress to the third leg on finding an article, they are asked to recall and to apply knowledge or skills that they learned or experienced in a previous leg. Expanding on the last example, in order to know where to go to find an article, the teams need to remember that in the first leg they were asked to locate the library’s A–Z databases list on the library’s website. This recall encourages learning by creating experiences that are useful for future problem-solving or task completion, and by continually being challenging, students stay engaged in playing the game.

**Practice and Safe Failure**

Since The Race requires students to use their bodies and their minds, it encourages students to be active participants in their learning. This pedagogical approach has been proven beneficial to student learning in both the traditional classroom format and in the design of games because players are allowed to practice their skills. The legs, as they are designed in The Race, give the students opportunities to practice their information-seeking skills in a format that is novel and fun. In The Race, teams practice searching the library catalog, looking for an article, making an interlibrary loan request, writing a citation, and asking for help from a librarian. In some cases, the skills are practiced multiple times. Students also get additional practice when their teams answer questions or complete tasks incorrectly.

Besides having the opportunity to practice their skills, The Race gives learners time to use their knowledge or to practice their newly learned skills in a low-risk environment where failure is mitigated and successes are encouraged—another good game design mechanic. As with any game, players may not get the correct answer the first time, but by having multiple opportunities for success, they have time to try different methods or to test different theories and to gain confidence in their abilities. Additionally, failure, or the mitigation of failure, is designed into the game. As students play through The
Race, they are given constant feedback regarding their answers and they have many opportunities to build their skills in a low-risk environment. Since they are working in a group environment, mistakes can be seen as a fault of the team and not of the individual. In this way, they can support one another and divert themselves from total disaster that could be detrimental to their confidence or motivation to continue.

**Competition and Collaboration**

Competition is a ubiquitous mechanic in games, whether it be the players competing against one another or themselves or the players working collaboratively to compete against a computer or other teams. The Race is designed as a competitive game in that the teams are trying to beat one another in order to win the prize. However, because no grades are attached with winning or losing the game, the competition is friendly and low-stakes. Burguillo’s study of games and competition-based learning discovered that games with a bit of friendly competition motivated students and increased their learning performance. Even so, the lure of winning the prize or being recognized as the winner can be a motivating element. Although some students may be motivated by beating the other teams and by winning the prize, the social aspects associated with collaborating and interacting with other classmates can also be engaging and motivate continued play. This social aspect can be especially important for students in a first-year seminar course who are looking to make new friends and to learn from each other’s experiences.

**Choice and Control**

Students’ ability to make decisions, develop strategies, and to have general control within a game has been shown to lead to increased motivation and greater learning. Admittedly, the amount of control in The Race is limited because the order of the legs is predetermined by the librarian and the goal of each task is specific, but there are some choices and decisions that the teams can make; the teams get to decide who will bring the completed sheets to the librarian and choose the strategies they will use to complete the legs. For example, in the first leg where students are asked to answer questions using the library website, some teams will divide the questions among each other and then share their answers with the rest of the team, and others will have each person work on their own and then share what they find with their teammates. By giving the students some control within the game, they understand that their choices and contributions matter to the overall outcome of the team.
Possible Adaptations

The Race is flexible because it can be adapted in different ways depending on the length of the class session, goals and objectives of the instructor or assignment, and the skill level of the students. In a fifty-minute class session, I recommend no more than four or five race legs, but if the class session is seventy-five or ninety-minutes, an additional one to three relevant legs can be included to fill in the time. If the goal of the instructor or the assignment is to visit the library and introduce students to library spaces, the legs can include having students visit specific locations in the library and take selfies there. Lastly, more or less detailed instructions can be given depending on the skill level or course level of the students in the class.

Conclusion

Librarians have long played games in one-shot information literacy sessions. The Research Race ties that tradition to game design best practices with clear goals, objectives and goals, acceptance and celebration of failure as part of learning, the provision of immediate feedback, practice and scaffolded learning, and student control. In The Research Race, these attributes can help improve pedagogical outcomes, student engagement, and motivation, while introducing them to both the physical and digital spaces of the library. Games as a form of teaching and learning will continue to be prominent in higher education and are an opportunity for libraries and librarians to engage game design mechanics as pedagogical strategies for developing new ways to teach students information literacy concepts in a way that is engaging, motivating, and encourages future learning and success.
Appendix 11A

Below is an example of The Research Race played by first-year seminar course.

Leg 1 of 4: Website / Basics  Team name: __________________________

In this leg of the race, explore the San Jose State University Library website (library.sjsu.edu) to answers these questions! Bring up the completed sheet to get the next leg.

1. What are today’s hours for the library? __________________________
2. How long can most undergraduates borrow library books? __________________________
3. “CSU+” and “Interlibrary Loan” are: (circle one)
   a. Characters on Adventure Time
   b. Free ways to get books from other libraries
   c. Library Cats
4. Librarians create Research Guides by subject area to help students get started with research. If you’re in the Biological Sciences research guide, what is the first suggested database for finding peer-reviewed articles? __________________________
5. Some professors & instructors put readings for their classes on Course Reserves so that everyone can use the material. For the class HIST 480: Mexico, how long can you check out the book Planet Taco: A Global History of Mexican Food? __________________________

Bring this completed sheet to the librarian to see if your team advances to the next leg of the race.

Leg 2 of 4: Finding a book  Team name: __________________________

In this leg, you are asked to use the OneSearch box on the main library homepage to look for a book.

1. Use the drop-down menu to select “San Jose State University Collections”
2. Find a book on the topic of: __popular Japanese culture________
3. Complete the following:
   Title________________________________________________________
   Author_______________________________________________________
   Call Number________________________________________________
4. Use the map provided to find the floor of Knight Library where the book should be. Floor #________

As a group, go find the book on the shelves and bring it back. (Note: If the book you’re looking for turns out to be missing, grab a book next to where yours should be.)
Turn in this completed sheet and the book to the librarian to complete this leg and to move onto the next leg.

Leg 3 of 4: Finding a journal article  Team name: __________________________

In this leg, go to the Articles by Subject tab on the homepage and choose Psychology as the subject. Select PsycINFO. You are asked to find a scholarly (peer-reviewed/academic) article on the topic of: gender in Argentina.

Type in: Argentina gender into the search box.

<<instructor inserts screenshot here>>

Part 1:
1. Fill in the information below for the most relevant article that is peer-reviewed (remember, the most relevant articles may not always be at the top. Articles not deemed relevant will be returned. Article cannot be the one mentioned in Part 2):
   Article title: __________________________________________________________
   Author(s): _____________________________________________________________
   Name of journal article was published in: _________________________________
   Year of publication: ______
   Volume number: _________
   Issue number: ______________
   Page numbers: ____________

2. Is the entire article available in full-text online? (hint: find the “FindText” link for best results)
   If so, from what database? _____________________________________________
   If not, how can you get the full-text of the article? _________________________

Part 2:
1. Find the article: “Teaching Gender and Sexuality at Public Universities in Argentina.”
2. Is it available electronically through the FindText link? _____________
   If yes, from which database? ___________________________________________
   If no, how can you get the full-text of the article? _________________________
Turn in this completed sheet to the librarian. If your answers are correct, you will move onto the last leg of the race.

**Leg 4 of 4: Getting Help**  
**Team name:** ______________

1. There is a librarian assigned to each subject or major. Who is the subject librarian for Geology? ____________________________

2. Name one way you can Ask a Librarian for help! ______________

Great job! This is the last leg of the race! Turn in this completed sheet to the librarian and (maybe) claim your prize.

**Endnotes**


17. Prensky, *Digital Game-Based Learning*, 120.


23. Gee, *What Video Games Have to Teach*, 114


25. Prensky, *Digital Game-Based Learning*, 122.


**Bibliography**


