

## EXPLORING GAMING TECHNOLOGY TO INFLUENCE ETHICAL RESEARCH

**Michelle Leonard  
Margeaux Johnson  
Donna Wrublewski  
Melody Royster  
Amy Buhler**

Marston Science Library  
University of Florida  
Gainesville, FL USA

### ABSTRACT

Librarians play unique roles in higher education. They may collaborate on research projects with scientists, or provide research instruction to graduate students. In a traditional setting, librarians often find themselves performing literature searches or tracking down the obscure article. In the digital age, with literature immediately accessible, a debate rages on how librarians can prove the relevance of the library and explore innovative instructional design techniques for greater impact on educating library patrons. One topic that is relevant to the entire scientific community is the responsible conduct of research (RCR). With the ease of access to information via the Internet, there is daily news that casts a pall over the scientific community with stories of plagiarism, falsification, and fabrication of data. Furthermore, journal publishers list updates on redacted papers for research misconduct. This paper will highlight how librarians can promote responsible conduct of research through a variety of educational efforts, including traditional face-to-face workshops for students and creating online resources. The authors will also showcase an online game to raise awareness of plagiarism, and falsification/fabrication of data. With a two year \$298,000 National Science Foundation grant, the authors created an online, self-directed, interactive game that provides a role-playing environment in which Science, Technology, Engineering, and Mathematics (STEM) graduate students learn to recognize and avoid plagiarism. The goal is to train STEM graduate students in U.S. institutions of higher learning to function effectively and ethically as authors within multi-national research teams.

**Keywords:** Gaming; librarians; ethics; research

### Background

Plagiarism and responsible conduct of research (RCR) is not just a problem at the University of Florida, or even an isolated problem; rather, it's a systemic problem in academia. It affects not only undergraduates but also graduates, postdocs, and professors. According to Don McCabe "plagiarism is the most critical and widespread misconduct issue facing beginning researchers" (2005). Furthermore, this problem is border-less and touches every continent. To find examples of academic misconduct, just conduct a Google search or read the website "Retraction Watch." From an international standpoint, how the education community defines academic integrity varies greatly. That which is defined as plagiarism by American standards is not viewed as such by many Asian or European standards, in which "...taking ideas and words from different books and writers to build an answer seems to be an accepted academic practice" (Pennycook 1996).

Research demonstrates that "[i]n some Asian cultures, students are taught to memorize and copy well-respected authors and leaders in their societies to show intelligence and good judgment in writing" (Thompson & Williams 1995). Also, "[i]n India, for example, undergraduates are not expected to cite sources and it is only at the graduate level where such activity is expected, but not necessary" (Handa and Power 2005).

One question is how U.S. academic institutions address the issue of finding a commonly acceptable practice for responsible conduct of research within multi-cultural collaborations. Luckily, the major science publishers

do outline their acceptable practices for publication, but this does not address the issues that may arise in research labs or on campuses.

Science Librarians at the University of Florida's Marston Science Library are not new to teaching these concepts. We regularly provide workshops, class sessions, and presentations on how to avoid research misconduct in Science, Technology, Engineering, and Mathematics (STEM) disciplines.

When the opportunity arose to apply for an Ethics Education in Science & Engineering (EESE) Grant offered by NSF, librarians at UF were a perfect fit. We were knowledgeable about the subject matter and we had been looking for ways to transition our face-to-face workshops to reach a wider audience, especially with the ethics training requirements for NSF funded universities outlined in the COMPETES Act. We would create an online, self-directed, interactive game in a role-adapting environment in which Science, Technology, Engineering, and Mathematics (STEM) graduate students will learn to recognize and avoid plagiarism. Once we were awarded the grant, we discovered that we needed to expand to include the top three issues plaguing scientific research. Therefore, we added falsification of data, and fabrication of data to the plagiarism component. We named our project "Bridging the GAP: Gaming Against Plagiarism."

Since games emphasize active learning and have proven success with increasing student engagement, which is an essential component of our discussion-based workshop, a game seemed like an innovative and appropriate instructional design approach for teaching graduate students about ethics. Furthermore, games allow students to explore concepts at their own pace without the fear of failure (you can always push restart or try again) and players can experience scenarios or make choices they may not have the opportunity to explore in real life. This is the idea that ethics must in some way be "felt." We posit that:

- Gaming is universal among college-aged students.
- Recent research on teenagers (future college students) shows that not only is game playing universal, but that game playing facilitates social discussions and "can incorporate many aspects of civic and political life" (Lenhart et al., 2008).
- Similar real life scenarios were used to create a collaborative design game with engineering students "to give students 'practical' experience of ethical decision-making in the process of design" (Lloyd and van de Poel, 2008).

## **GAP**

The three mini-games that make up the GAP project games were part of a two-year design, development, and testing process. Documentation can be found on our blog (<http://blogs.uflib.ufl.edu/gap/play>) along with all the research and presentations surrounding the grant.

10

The games increase in knowledge and complexity, from identification of types of FFP misconduct to explaining the potential consequences to finally applying the rules of ethical research to increasingly complex scenarios. This type of pedagogical representation is based on the revised Bloom's Taxonomy.

Let's take a brief look at the 3 mini games.

Game 1: Cheats & Geeks



*Game 1. Cheats and Geeks.*

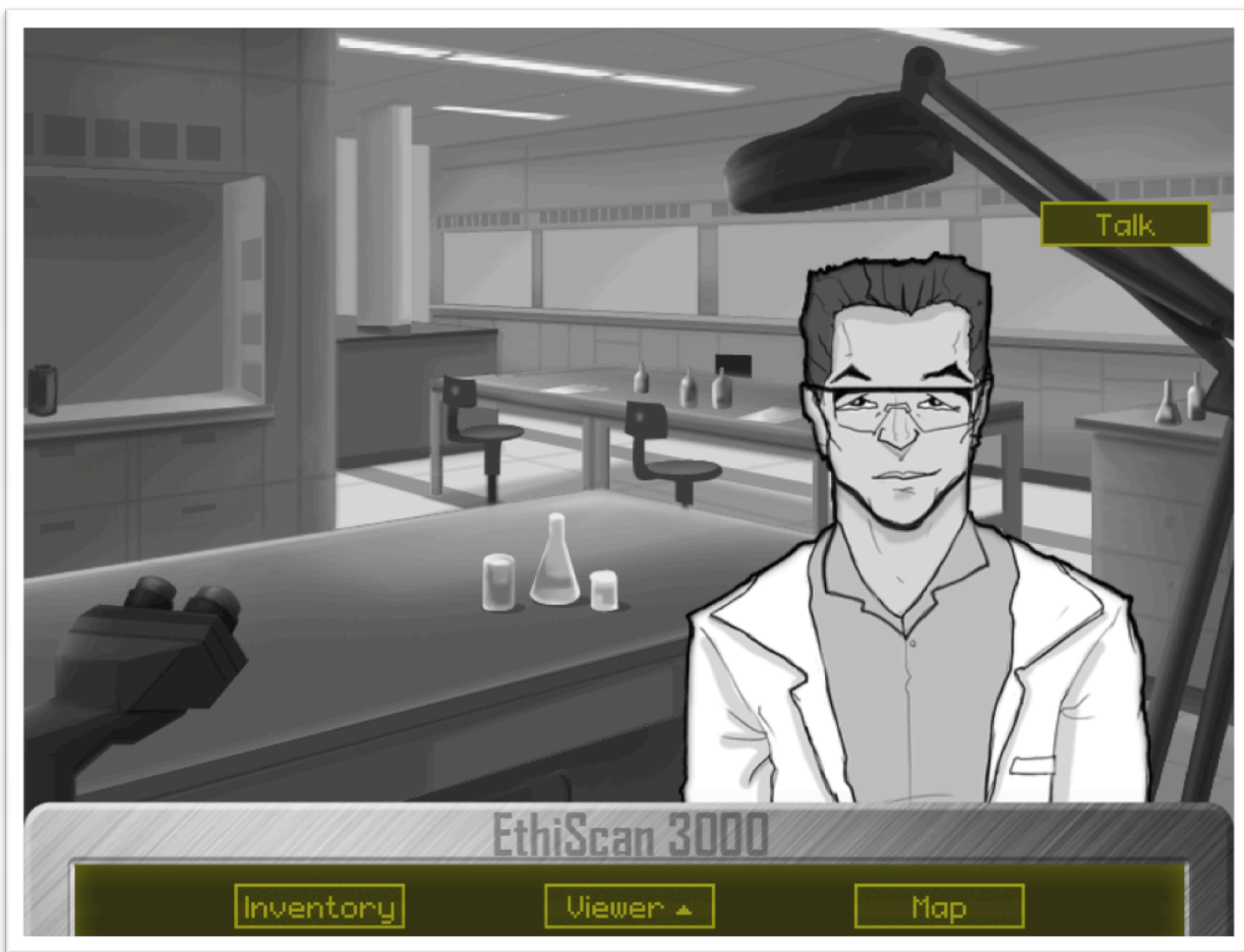
Cheats and Geeks introduces players to the basic concepts of plagiarism, data falsification, and data fabrication as they race an opponent to be the first to present their findings at a science convention. Throughout the game pop quizzes test students' understanding of research misconduct. Controversially, players have the option to cheat in their race to get ahead – but not without consequences in the end.



*Game 2. Frenetic Filing*

In Frenetic Filing, the second GAP mini-game, students work at the Research Misconduct Office on campus. This fast-paced game requires players to think on their toes as they identify research misconduct violations by their definitions and then sort them into the correct files. High Scores are posted at the end of the game, which encourages students to replay the game for the ultimate high score on campus.

Game 2 is the most versatile of the 3 mini-games and can be used in library instruction setting. For example, the librarian or instructor may wish to divide the class into two groups, and each group take a turn playing the game. This is a great way to engage the entire class within a team-building environment.



*Game 3. Murky Misconduct.*

Murky Misconduct, the final mini-game, is the most sophisticated and complex of the games. It has a noir detective feel. Students play the role of a plagiarism investigator on campus as they collect facts, compare evidence, and build cases against suspected research misconduct perpetrators. Eventually, players solve the case and accuse the violators.

Once a student has completed all three mini-games, they have the option to print out a certificate of completion.

The grant project was completed in the fall of 2012. The game is freely available for any institution to download and to use for instruction.

### **Traditional RCR Training**

No matter the type of instruction, game based or in a traditional lecture/discussion format, the teaching of ethics education and responsible conduct of research is very important. For those who are not comfortable teaching in a games based environment, the science librarians created a comprehensive LibGuide (<http://guides.uflib.ufl.edu/stemrcr>) that fosters discussion of all components of RCR training.



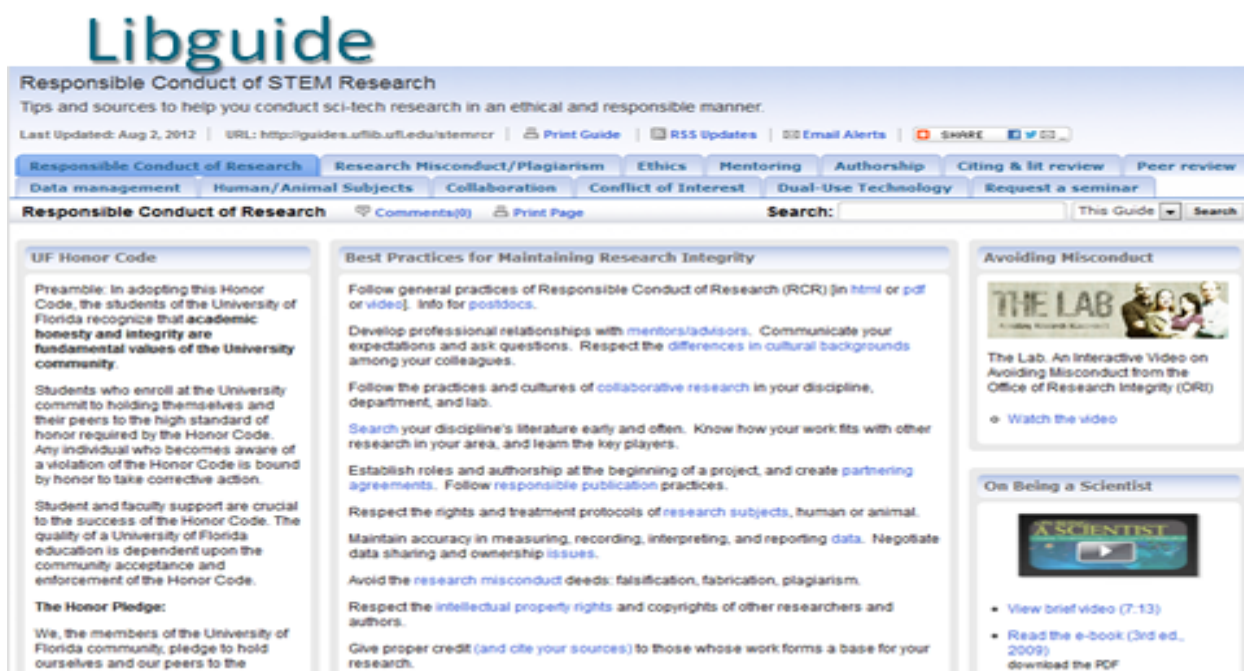


Figure 1. RCR LibGuide.

This allows the librarian to discuss the components of RCR training, such as research misconduct, authorship and peer review, mentoring, data management, human/animal subjects, conflicts of interest, dual-use technology, and collaboration science. Each tab identifies a specific component, and includes case studies, videos and examples of best practices. By working through this LibGuide, the instructor can meet the objectives of this tutorial:

- To raise awareness of all the components of Responsible Conduct of Research.
- To point to sources to increase knowledge of research conduct.
- To prepare and to prevent research conduct problems and to respond when needed.
- To create a foundation for when to use tools and services to support research.

The science librarians offer this workshop at the beginning of each semester at the library, and are routinely invited to present at department-sponsored events. To date, this is one of the most attended workshops offered by the science librarians.

### Further research

The teaching of ethics and RCR in STEM related disciplines is a new adventure for science librarians. Yet research shows that this is a necessary training, especially for academics applying for nationally funded grants. To this end, further research is needed to demonstrate the effectiveness of RCR training, and how to best approach this type of training. We posit that:

- Further long-term research is needed to study the effectiveness of using games for RCR training, especially with KSA (Knowledge, Skills & Attitudes)
- RCR training is needed at all levels. Librarians can act as the “neutral” zone
- Great opportunity to develop new partnerships with campus administration, faculty and students.

### Conclusion

Given the substantial documentation of significant differences in cultural attitudes towards plagiarism, cutting-edge 21st century science will require common ground for preparing and publishing results in the

scientific literature. The game will provide this common ground. As the saying goes, "good science is ethical science." Librarians can go a step further and declare that, "good research is ethical research."

## References

- Federation of American Scientists. (2006). *Summit on educational games: Harnessing the power of video games for learning*. Washington, D.C.: Federation of American Scientists. Retrieved from [http://www.fas.org/gamesummit/Resources/Summit on Educational Games.pdf](http://www.fas.org/gamesummit/Resources/Summit%20on%20Educational%20Games.pdf) .
- Federation of American Scientists. (2007). *Why games?* Retrieved 2/16/2010, from [http://www.fas.org/programs/ltp/games/why\\_games.html](http://www.fas.org/programs/ltp/games/why_games.html) .
- Handa, N., & Power, C. (2005). Land and discover! A case study investigating the cultural context of plagiarism. *Journal of University Teaching and Learning Practice*, 2(3), 64-84. Retrieved from <http://ro.uow.edu.au/jutlp/vol2/iss3/8> .
- Lenhart, A., Kahne, J., Middaugh, E., Macgill, A., Evans, C., & Vitak, J. (2008). *Teens, video games and civics*. Washington, D.C.: Pew Research Center's Internet & American Life Project. Retrieved from <http://www.pewinternet.org/Reports/2008/Teens-Video-Games-and-Civics.aspx>
- Lloyd, P., & van de Poel, I. (2008). Designing games to teach ethics. *Science & Engineering Ethics*, 14(3), 433-447. doi:10.1007/s11948-008-9077-2 .
- McCabe, D. L. (2005). Cheating among college and university students: A North American perspective. *International Journal for Educational Integrity*, 1(1), 2/16/2010. Retrieved from <http://www.ojs.unisa.edu.au/index.php/IJEI/article/view/14>
- National Academy of Sciences. (1995). *On being a scientist: Responsible conduct in research* (2nd ed.). Washington, D.C.: National Academy Press.
- Pennycook, A. (1996). Borrowing others' words: Text, ownership, memory, and plagiarism. *TESOL Quarterly*, 30(2), 201-230.
- Thompson, L. C., & Williams, P. G. (1995). But I changed three words! Plagiarism in the ESL classroom. *Clearing House*, 69(1), 27-29.