Our goal is to make the game as fun and active approach to providing science education.

Throughout the development and game phases, librarians conducted three distinct types of assessment:

- Usability testing
- Pre/post test with game play
- Focus groups

LIBRARIES TESTING
After the development of each of the three mini-games, the librarians conducted usability testing, using "Think Aloud Protocol" (TAP), to assess feedback on game design, navigation, time to completion, and accessibility. Additionally, players answered a questionnaire on content comprehension related to playing modules within the game through semi-structured interviews. The ultimate purpose of usability testing was to provide essential feedback to the design team throughout the development process.

PRE/POST TESTS
With the completion of game development in Summer 2012, the game is currently in its final evaluation phase. During this phase, librarians recruited STEM graduate students from other U.S. institutions to play the entire game and complete a pre and post-game test, using the same questions. The group of players learned new knowledge from the game. The library team is monitoring and analyzing these results through August 2012.

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Game Assessmen

STEM ETHICS
ROIs in the literature includes the ethical issues of Fabrication, Misattribution, and Plagiarism (199). These issues are complex and subtle, perspectives on what constitutes RCR is ambiguous. One approach to teaching research ethics in STEM is to introduce the underlying concepts of IPP and then to discuss cases and role that illustrate the gray (3). The GAP game employs this approach and presents:
- Data Fabrication
- Data Misattribution
- Stealing
- Misquoting
- Insufficient paraphrasing
- Self plagiarism.

HIGH LEVEL: EVALUATION
The third and fourth mini game, "Mystery Macworld", corresponds with the high order skills of Synthesis and Evaluation. Players in the research misconduct detectives and explore complex cases in depth. They travel through campus, collecting evidence and present these to suspected texts. Students must examine the evidence to judge if a violation occurred, and formulate an accusation if there is a misconduct. The process of assessing the possibility and justifying their decision requires critical thought. To win the game students are forced to confront an aggressive violator who takes the form of a research misconduct detective. Through this encounter of a person of high status students realize that research misconduct occurs at all levels.

MID-LEVEL: APPLICATION
Mini-game 2, "Paper or Filigree", challenges students to engage with middle order skills related to application as they identify, define, and classify these in various categories for the Research Ethics Office. The mini-style game style game students still practice as they work with more nuanced definitions of plagiarism. The player collects papers as they arrive at the office and travels for review. A new sentence summary related to the type of misconduct is presented and the player must examine the evidence, compare it to the definition, and classify the misconduct. Students are rewarded for accuracy, consistency, and agreed with game aspirations. The advanced level feature is for students overall over level areas are displayed. The goal of the game is to help students construct an understanding of the complex evidence that they will need to gather when they are presented to Research Ethics in the third mini-game.

LOW LEVEL: KNOWLEDGE
The first mini-game in the IPP series, "Checks and Boxes", relates to the lower order skills of Bloom's taxonomy. Comprehension is key to the board-game style game, players have to choose the word in the form of a puzzle game. Players and treatment of data (3P) in this mini-game. Players have to choose if they possess evidence and if they possess evidence then they move to the next step to present evidence of different types of misconduct. When the player wins the game, it is revealed that research ethics breaches are epidemic on the campus and as a result, graduate students will be working in the Research Ethics Office. In game 2 where they will categorize variables into type of misconduct.

STems & Blooms Cultivating Ethical Practice Through an Online Game

ABSTRACT

Library staff at the University of Florida takes a proactive role in educating Science, Technology, Engineering, and Mathematics (STEM) graduate students about Responsible Conduct of Research (RCR). As part of the NSF funded Education in Science and Engineering program, the Marston Science Library received a two year grant to design a video game to engage STEM graduate students with research ethics. The project "Gaming and Ethics" (GAP) series was developed in Fall 2010 and will be made available on our open source software for universities and libraries worldwide. This project maps the levels of the game (three mini-games) directly to the pedagogical levels in Blooms Taxonomy to demonstrate how technology brings concepts early on in a game play can prepare students to face more complex theoretical issues. Specialized learning environments contribute to the fast changing nature of STEM education. The new digital tools created from this project may allow librarians to address future ethical issues in their unique and collaborative environment.

STEM TAXONOMY

BLOOM'S TAXONOMY

The taxonomy of educational objectives: the classification of educational goals known commonly as Bloom’s Taxonomy, provides a framework for designing educational objectives. Using Bloom’s taxonomy, librarians on the GAP team developed learning objectives to enable STEM graduate students to conceptualize the complex issues surrounding research ethics. In the series of mini-games, players scaffold concepts from the lower levels of Bloom’s (Knowledge—understanding the authors who construct research misconduct) to the higher levels of Bloom’s (Evaluation—judging class in research ethics cases and justifying decisions).