

Game On: A playful approach to ethics education in STEM

Presented by:

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GAP: Gaming Against Plagiarism

The game will be an online, self-directed, interactive game that will provide a role-adapting environment in which Science, Technology, Engineering, and Mathematics (STEM) graduate students will learn to recognize and avoid plagiarism.

...furthermore, the game will

- Employ strategies intended to influence students' ethical behavior;**
- Explore the impact of peer behavior, institutional norms, and differing cultural practices on plagiarism;**
- Heighten awareness on the falsification & fabrication of data;**
- Meet the requirements of the America COMPETES Act, Section 7009.**

...and

- **Be collaboratively designed, tested, and evaluated through a multi-disciplinary iterative development process by recognized experts in graduate science education, gaming, academic integrity, and educational digital media production.**
- **Have an open source approach that will allow each institution to integrate its own code of conduct, relevant policies, and branding while maintaining a common focus on what constitutes responsible conduct of research.**

Why plagiarism?

In 2005, a broader survey of 63,700 undergraduate students and 9,250 graduate students revealed that

62% of undergraduates

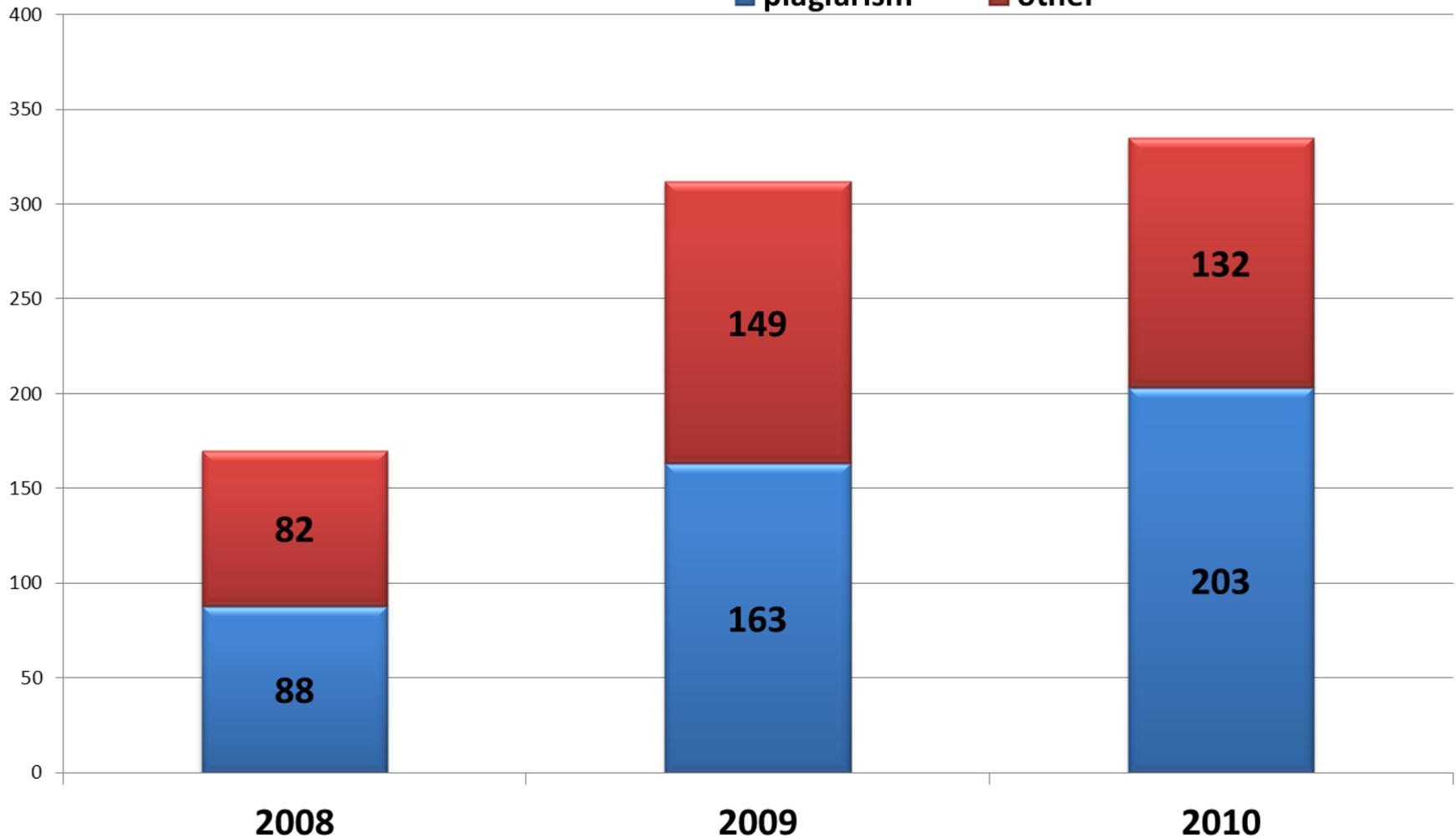
59% of graduate students

had engaged in “cut and paste” plagiarism from either print or electronic sources at least once in the last three years. (McCabe 2005)

Case in point @ UF

Ethics & Plagiarism Cases @ UF

■ plagiarism ■ other



Is it really plagiarism?

- **“In 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).
- **“What is defined as plagiarism by American standards is not defined 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).
- **“In 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).

Why gaming?

- **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 by Lloyd and van de Poel (2008) to create a collaborative design game with engineering students “to give students ‘practical’ experience of ethical decision-making in the process of design.**

....game on

- **Develop a culturally-sensitive tool reflective of the future ethical considerations faced by U.S. global researchers publishing in a multi-cultural research environment;**
- **Incorporate game design strengths identified at the NSF co-sponsored National Summit on Educational Games: higher order skills, practical skills, practice for high performance situations, and developing expertise;**
- **Assure scalability and robustness of design to permit future content enhancements to cover additional aspects of responsible research conduct, such as the falsification and fabrication of data.**

where to begin?

Graduate students in all STEM departments were sent a survey on the perceptions of plagiarism.

~4500 STEM graduates were sent the survey

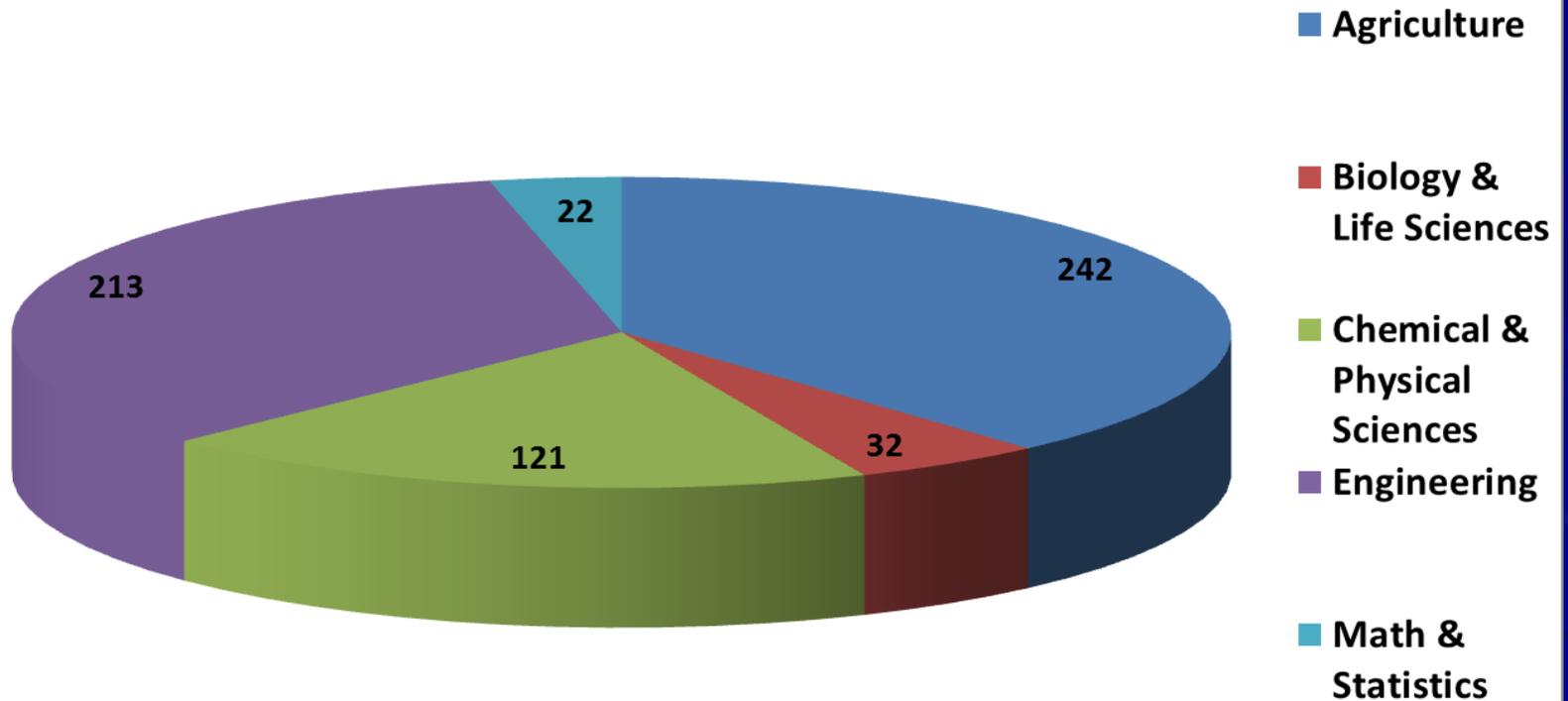
~855 grads reviewed the survey

~650 grads answered each question

~146 responses to each open ended question

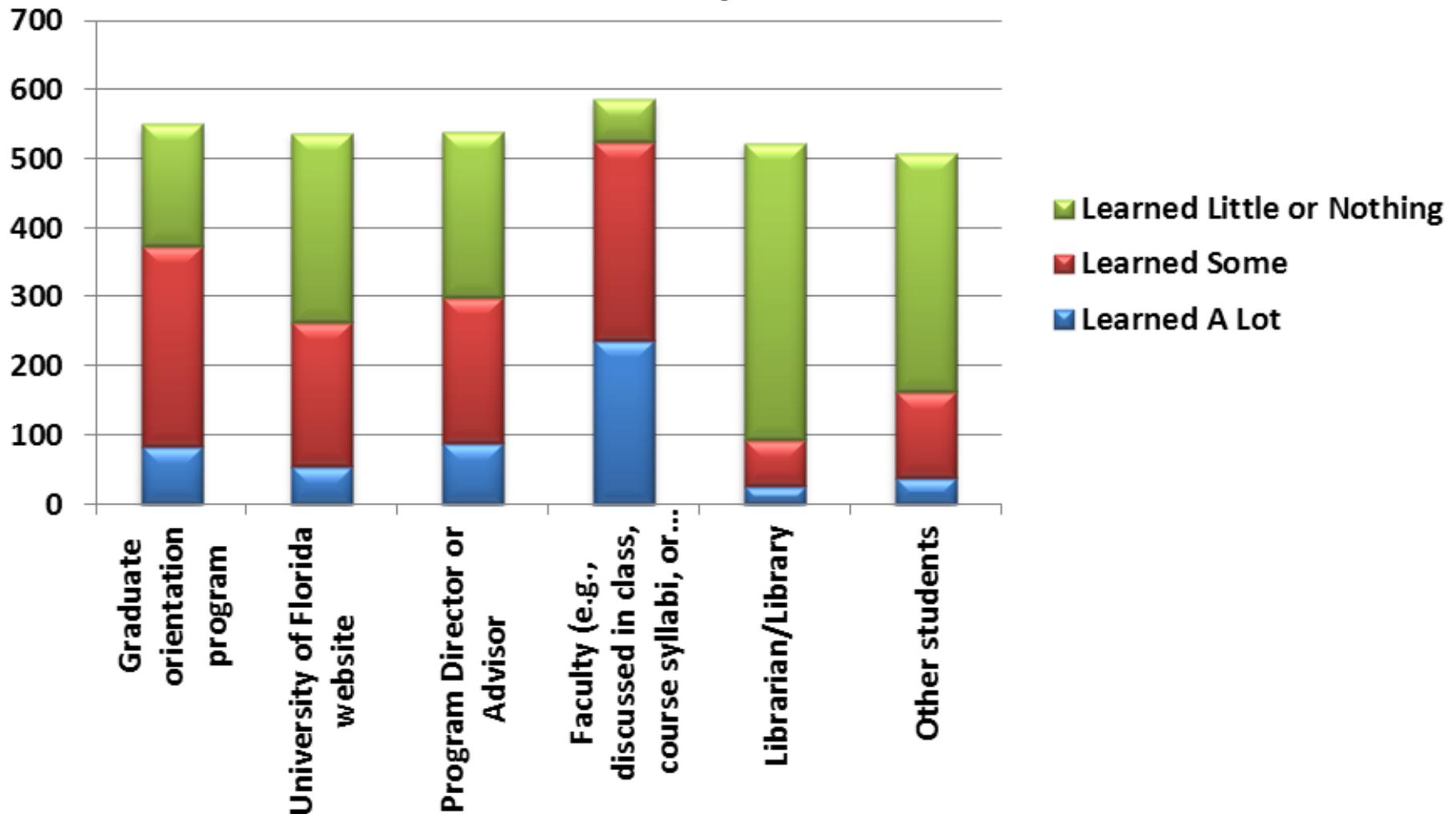
participants

of STEM grad responses



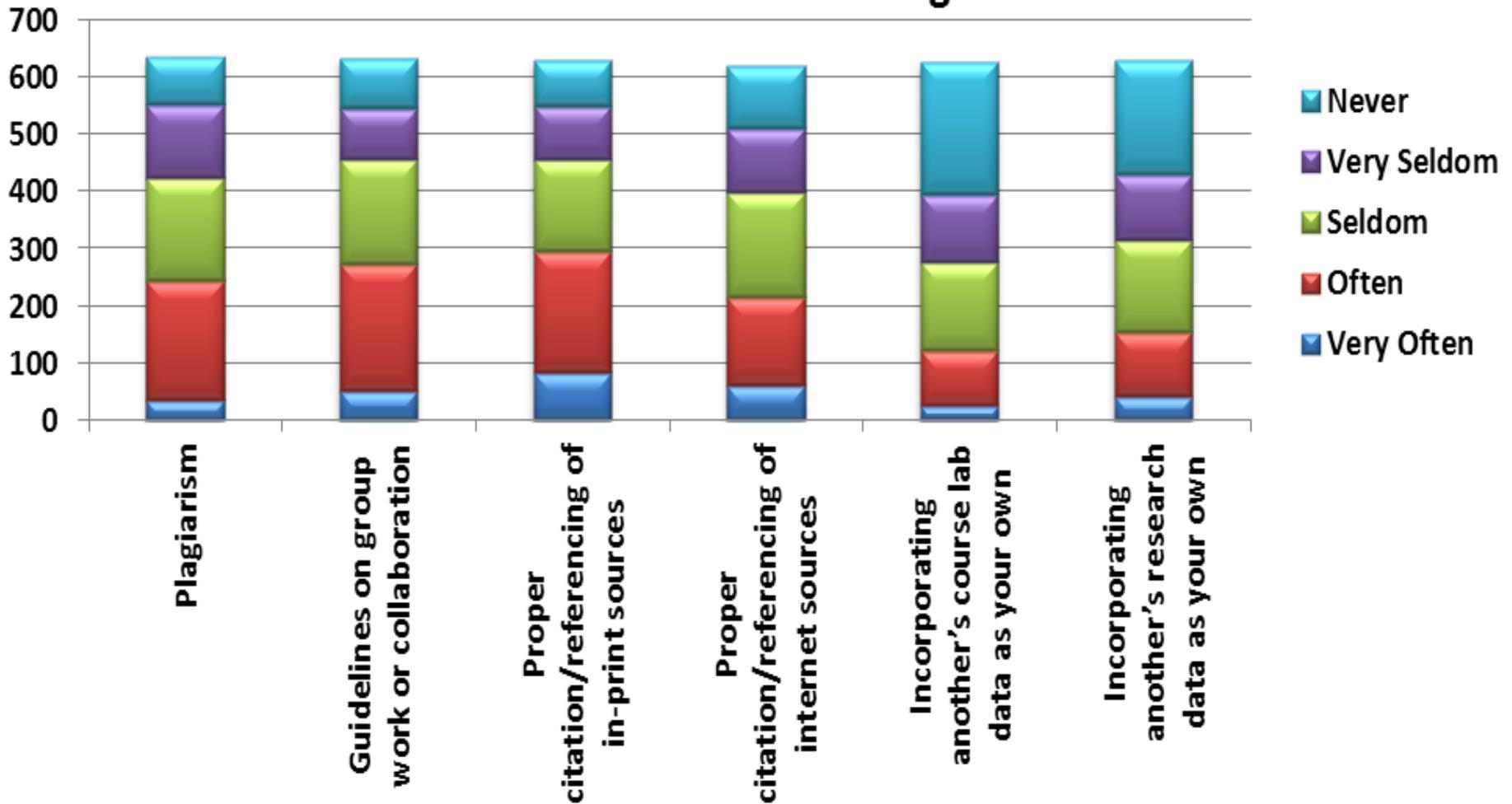
Survey: Perceptions in Plagiarism @ UF

Where & how much have you learned about the UF Honor Code policies?



Survey: Perceptions in Plagiarism @ UF

In the past year, how often did your professors discuss policies concerning:



Survey: Perceptions in Plagiarism @ UF

Please mark how serious you think each type of behavior is.

Answer Options	Not Plagiarism	Trivial	Moderate	Serious	Response Count
Working on an assignment with others (in person)	30	102	280	223	635
Working on an assignment with others (via e-	34	122	269	209	634
In a course requiring computer work, copying another	7	12	82	532	633
Incorporating another's course lab data as your own	6	16	126	485	633
Incorporating another's research data as your own	4	2	35	592	633
Paraphrasing or copying a few sentences from a	10	26	190	408	634
Paraphrasing or copying a few sentences from a	8	38	179	408	633
Turning in a paper written and previously submitted by	5	1	9	620	635
Quoting another author in your own work without citing	7	20	147	460	634
Copying material, almost word for word, from any	4	1	25	604	634
Turning in work done by someone else	6	3	25	600	634
Turning in the same paper for another class	91	129	218	195	633
Copying and pasting directly from several different	11	25	112	484	632
Accidentally or purposely adding/deleting/changing	30	89	261	251	631
<i>answered question</i>					637

Survey: Perceptions in Plagiarism @ UF

How strongly do you agree or disagree with the following statements?

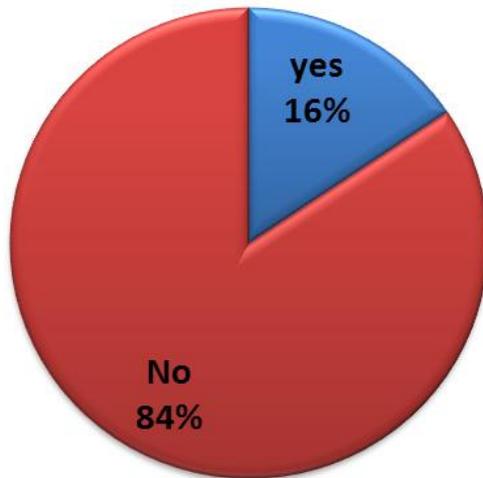
Answer Options	Disagree Strongly	Disagree	Not Sure	Agree	Agree Strongly	Response Count
Plagiarism is a serious problem at UF.	8	43	349	156	81	637
Investigation of suspected incidents of plagiarism is fair and impartial at UF.	12	23	407	146	44	632
Faculty members are vigilant in discovering and reporting suspected cases of academic dishonesty, specifically plagiarism.	18	105	242	229	39	633
Faculty members change assignments on a regular basis.	24	154	243	178	34	633
The amount of course work I'm expected to complete is reasonable for my year level and program.	6	39	49	416	122	632
The degree of difficulty in my assignments is appropriate for my year level and program.	6	19	53	422	131	631
The types of assessment used in my courses are effective at helping me learn course concepts.	4	40	64	409	114	631

answered question

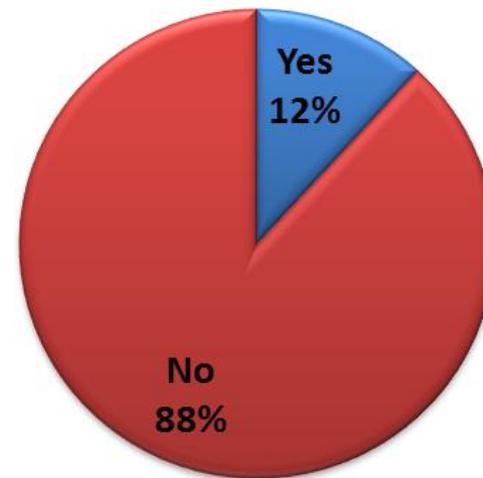
637

Survey: Perceptions in Plagiarism @ UF

Has someone ever taken credit for or plagiarized your work? n=636



Have you ever reported another student for plagiarizing an assignment? n=634



Open ended comments: personal experiences

- **“In my country, college students plagiarise usually because tutors do not supply them with enough materials and tools to handle their assignments alone. No one want to steal someone else' property if he has a better choice, though I disagree strongly against it myself.”**
- **“In my PhD program, I took a stats class. A foreign student asked me to help her with an assignment that was due the next day. She asked me to look at my finished assignment. I thought that she would just look it over to get a general idea of what needed to be done or compare the answers that she got in order to improve her own assignment (I've done this before). Afterwards, when I saw her assignment, I saw that she had pretty much copied my assignment. I didn't complain because I didn't want to create a conflict with a colleague, but I disagreed with what she had done and I kept my distance from this student afterwards.”**
- **“Take home exams and projects often turn into group efforts in graduate school. It is appalling. Particularly at the graduate level when your work should truly be for your own development.”**

Open ended comments: other comments

- **“It is not punished seriously enough at this level and students do not take it seriously. It seems as though instructors are burdened by it and can not protect themselves from it. Students do not seem to have problems using other students' work.”**
- **“In research, students should have a choice to raise their concern against supervisors officially on which investigation can be carried out. This happens a lot in research wherein the Professor uses data from investigation carried out by student to write proposals without giving full credit to the student. This is a clear example of Plagiarism.”**
- **“Most teachers discuss plagiarism, but I don't think that most of them check to make sure its not going on.”**
- **“The process for prosecuting plagiarism at UF is quite cumbersome and weighted in favor of the student. In fact, many faculty would rather ignore or deal with plagiarism at the course-level rather than refer the plagiarism to UF's student conduct court.”**

5 phases of GAP

Phase 1: Content

Phase 2: Design

Phase 3: Usability

Phase 4: Implementation

Phase 5: Evaluation

Phase 1: Content

Sept 2010 - Feb.2011

Phase 2: Design

December 2010-December 2011

Phase 3: User Testing

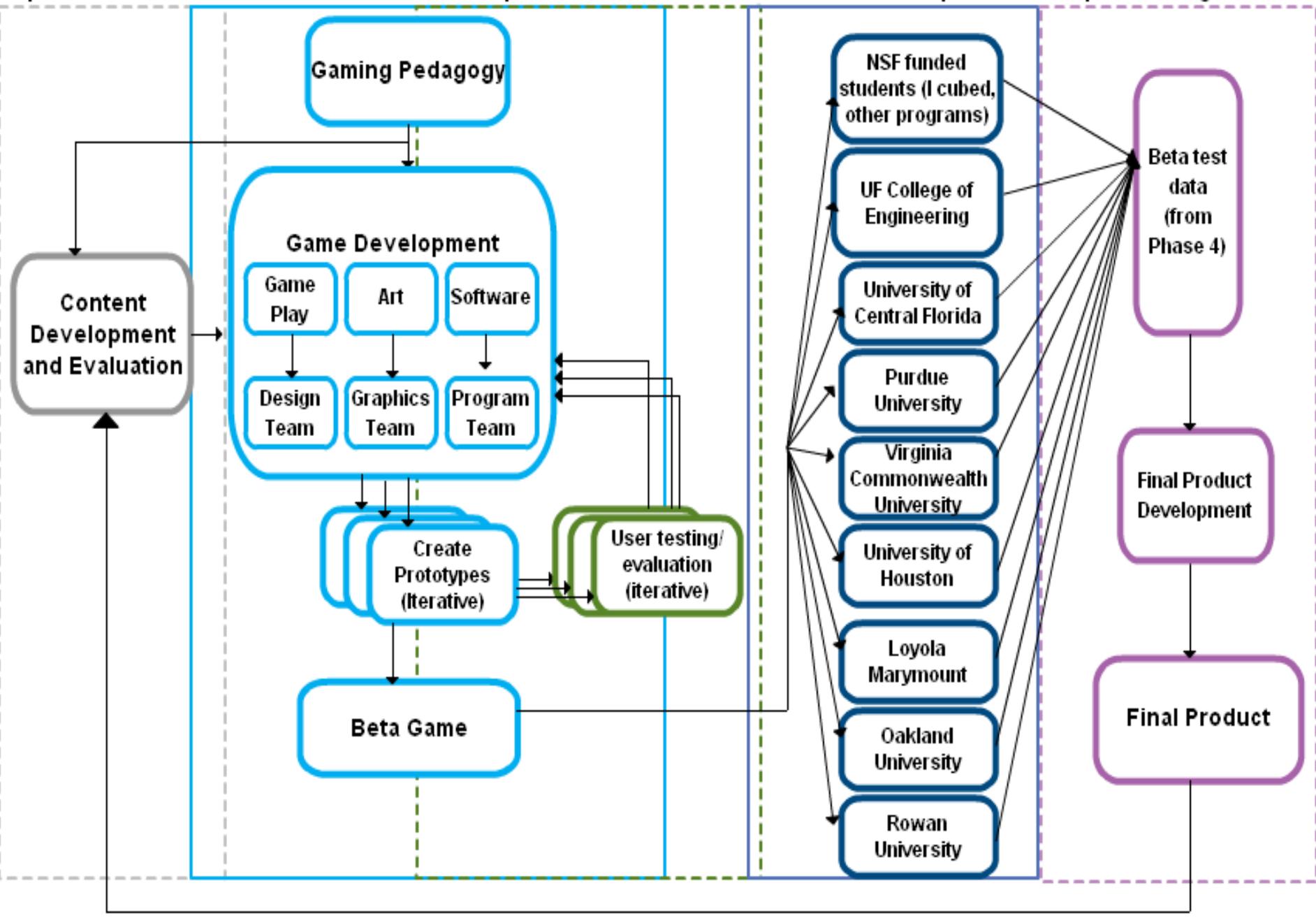
April 2011 - December 2011

Phase 4: Implementation

December 2011-April 2012

Phase 5: Evaluation

April 2012 - August 2012



Phase 1: Content



Content Sources

- **Published literature**
- **Collective past experience**
- **Baseline survey of graduate students regarding perceptions of plagiarism**

Phase 1: Content

6 Major Learning Objectives

1. Identify major types of contemporary plagiarism
2. List the basic rules to avoid plagiarism
3. Demonstrate ability to apply the rules in increasingly complex scenarios.
4. Explain copyright, fair use and author's rights (i.e. intellectual property rights).
5. Explain the potential consequences of plagiarism academically and professionally.
6. Recognize and acknowledge differences in cultural approaches to plagiarism.

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Phase 1: Content

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Phase 1: Content



- Identify major types of plagiarism
- List basic rules to avoid plagiarism
- Identify data falsification and fabrication

Explain the potential consequences of plagiarism both academically & professionally

- Apply the rules to increasingly complex scenarios
- Recognize and acknowledge differences in cultural approaches to plagiarism

Phase 1: Content

Master content document that includes definitions and real-life examples

Dr. Roger's research group is studying the effect of adding colloidal silica to epoxy materials to create new nanocomposite materials. She sees a paper that has already been published detailing the addition of fumed silica to epoxy. Most of the background of the experiment and methods are identical to her work, so she incorporates those sections from the previous paper into her own publication without attribution. She uses data from her own experiments.

Phase 1: Content

Short sorting scenarios:

- I combined the findings of these 8 sources into one paragraph. I don't have to cite them, because I created the compilation. (*patchwriting*)
- I submitted the same paper to more than one class. It's OK that I copied my own work without citing it because it's still my idea. (*self plagiarism*)
- I quoted something but changed one word to strengthen its support of my argument. (*misquoting*)

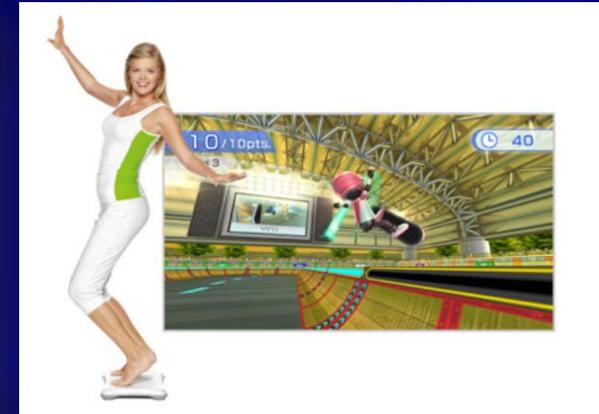
Phase 2: Design



Why Games?

UF

Design



Design

Video games are powerful tools for learning.

Design

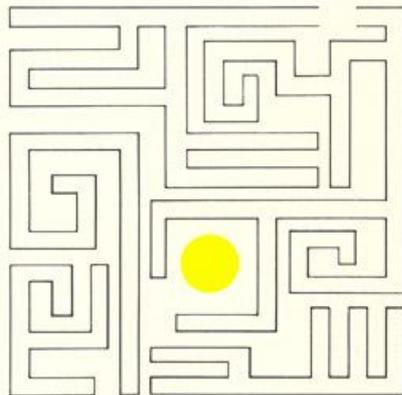
1. Active, Critical Learning Principle
2. Design Principle
3. Semiotic Principle
4. Semiotic Domains Principle
5. Metalevel Thinking about Semiotic Domains Principle
6. Psychosocial Moratorium Principle
7. Committed Learning Principle
8. Identity Principle
9. Self-Knowledge Principle
19. Amplification of Input Principle
11. Achievement Principle
12. Practice Principle
13. Ongoing Principle
14. "Regime of Competence" principle
15. Probing Principle
16. Multiple Routes principle
17. Situated Meaning Principle
18. Text Principle
19. Intertextual Principle
20. Multimodal Principle
21. Material Intelligence Principle
22. Intuitive Knowledge Principle
23. Subset Principle
24. Incremental Principle
25. Concentrated Sample Principle
26. Bottom-up Basic Skills Principle
27. Explicit Information On-Demand and Just In-Time Principle
28. Discovery Principle
29. Transfer Principle
30. Cultural Models about the World Principle
31. Cultural Models about Learning Principle
32. Cultural Models about Semiotic Domains Principle
33. Distributed Principle
34. Dispersed Principle
35. Affinity Group Principle
36. Insider Principle

(Gee, 2003)

SERIOUS GAMES

CLARK C. ABT

The art and science of *games that simulate life*—in industry, government, education, and personal relations, interpreted with examples by a leading exponent and innovator



CLARK C. ABT

SERIOUS GAMES

Clark C. Abt explores the ways in which games can be used, not just for themselves or for pleasure, but to instruct, inform, and educate us all through the experimental and emotional freedom of active play united with the precision of abstract thought.

"... anyone interested in a new approach to national problems should give *Serious Games* serious consideration."

—*Library Journal*

Clark C. Abt is the founder and chairman of Abt Associates, Inc., a firm that has pioneered in the development of games and simulation techniques for solving problems in a wide variety of social, economic and industrial contexts. He was graduated from M.I.T. in engineering, received an M.A. from Johns Hopkins, worked as a systems engineer for ten years, and returned to M.I.T. for a Ph.D. in political science before founding Abt Associates, Inc., in 1965.

Cover design by Patty Berns

0-8191-6148-9

Design

Major paradigms in Serious Game Design

Gamification

Holistic – Systemic Learning

Design



Design



solving complex problems



Content meets Design



- Identify major types of plagiarism
- List basic rules to avoid plagiarism
- Identify data falsification and fabrication

Explain the potential consequences of plagiarism both academically & professionally

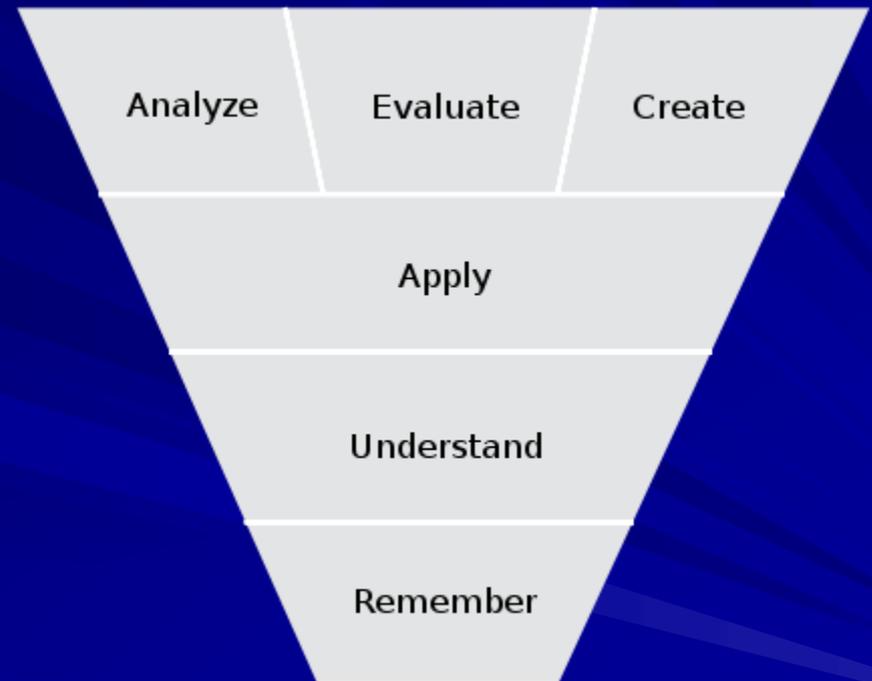
- Apply the rules to increasingly complex scenarios
- Recognize and acknowledge differences in cultural approaches to plagiarism

Content Meets Design

Level 3 – Apply & Recognize

Level 2 – Explain consequences

Level 1 – Identify & List



(Anderson & Krathwohl, 2001)

Design

Content learning objectives are one major component of our overall design task.

Design

Another major component of the overall design task is to make games that our audience wants to play.

Design

Focus Groups for Design Research

Design

**Focus Groups partnered with the I³
graduate student groups**

Design

Focus Group Method

1. diverse attitudes toward video games
2. very diverse preferences for game genres
3. Preference for a “meta-game” environment

Design

Major Design Task Components

1. Meet content learning objectives
2. Make learning games that reach a wide audience

Design

Overall Design Structure

A series of short, modular mini-games linked together with an interactive fiction narrative.

Design

Overall Design Metaphor

Meta-Game Story

HINDUSTAN TIMES, MUMBAI
THURSDAY, DECEMBER 02, 2010

hindustan

'Cramped classes leading to rampant copying

CHARGES Senior professor blames improper seating arrangement

Charu Sudan Kasturi
■ charu.kasturi@hindustantimes.com

NEW DELHI: Crowded classes at the oldest Indian Institute of Technology, Kharagpur, may have spawned an unexpected problem — increased copying among students in crucial tests that determine their overall performance at the premier engineering school.

Senior IIT-Kharagpur computer science professor Rajeev Kumar has written to top Institute authorities pointing out "rampant copying" among students, especially in subject examinations held by specific departments.

This cheating is a result of improper seating arrangements, Kumar has written to Director Damodar Acharya and Institute examinations in-charge B Maiti, requesting a special meeting of the IIT Senate to discuss the problem.

But senior IIT-Kharagpur officials are blaming the space crunch caused by the massive 54 per cent increase in total student intake following the implementation of the OBC quota law, to explain their inability to space student test-takers better.

The hike in total student intake — across categories — means that the IIT is currently faced with a space shortage in classes, hostels and in examination halls. This space shortage forces the IIT to seat students appearing for the same subject next to each other, facilitating cheating, the officials argued.

But while curbing any copying is a priority, ensuring stu-



■ IIT-K is currently faced with a space shortage in classes, hostels and in examination halls.

FILE PHOTO

dents appearing for the same subject test do not sit next to each other will not be easy, they said. "We now have 1,400 first year students who appear for the same subjects. We are struggling for space. Fancy seating arrangements are something we cannot afford at the moment," a senior administrator said.

Scores in the IIT examina-

tions all contribute to the cumulative grade point average (CGPA) of students at the end of their course.

The CGPA plays a key role in determining eligibility of students in the eyes of companies that come for on-campus placements, and higher educational institutions.

Kumar has suggested mapping the student seating to the

subject they appear for, and then ensuring that no two subjects are close to each other. He has argued that this system of seating was followed earlier based on his proposal and had proved successful.

"Professor Kumar's argument appears justified, and his suggestion should be followed. But if space is indeed a barrier in implementing Kumar's solu-

tion, the Institute's position must also be understood," another senior IIT Kharagpur professor said.

Kumar is arguing that his seating suggestion can be followed despite the space constraints but IIT authorities argue they need an upcoming new academic block to be ready for seating problems to be sorted out.

PROF VS AUTHORITIES

KUMAR'S VIEWS

- "Rampant copying" among students, especially in subject examinations held by specific departments.
- This cheating is a result of improper seating arrangements
- Need an upcoming new academic block to be ready for seating problems to be sorted out
- Kumar has suggested mapping the student seating to the subject they appear for, and then ensuring that no two subjects are close to each other

ADMINISTRATION'S DEFENCE

- Blame the space crunch caused by the massive 54 per cent increase in total student intake following the implementation of the OBC quota law
- This space shortage forces the IIT to seat students appearing for the same subject next to each other, facilitating cheating
- Have 1,400 first year students who appear for the same subjects. Fancy seating arrangements are something we cannot afford at the moment

Meta-Game Story



Meta-Game Story



Meta-Game Story

START CONQUERING THE WORLD
08 - 08 - 08
POPULAR COURSES >>

EVIL GENIUS UNIVERSITY
learn to be bad, the good way

6 LOCKED OUT Category: CORE Description: Students learn how to pick locks, open safes, break combinations, and more in this introductory course called Locked Out. Units: 4	77 ROBIN HOOD Category: History Description: Students will study and learn the life and times of Robin Hood. The Prince of Thieves. Students are required to steal from the rich and give to the poor. Units: 4	123 HACKING 101 Category: Mathematics Description: Students learn various computer hacking techniques. They are required to study algorithms and statistics. Units: 4
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Meta-Game Story

**Who stands between the university and
utter chaos?**

Meta-Game Story

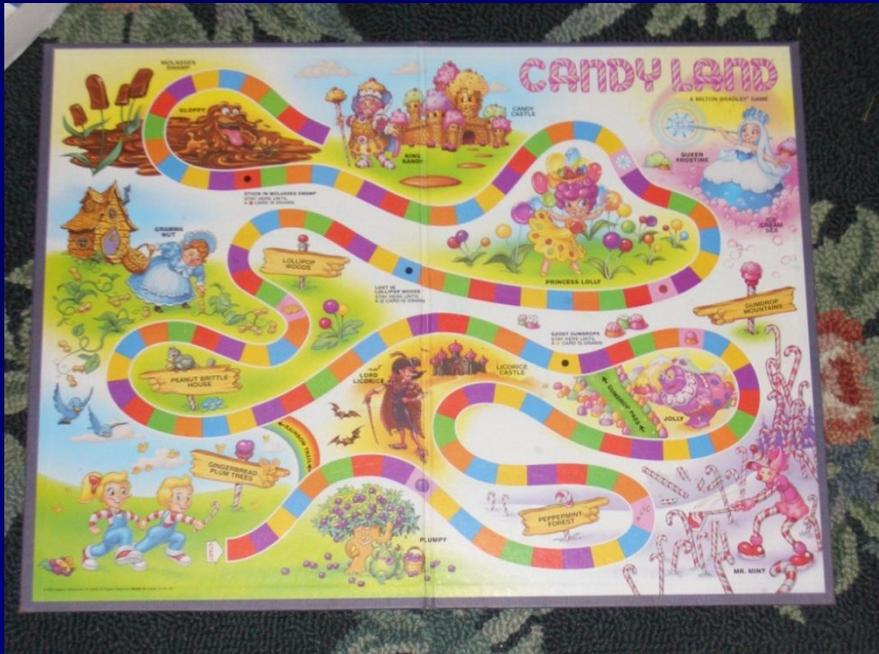


Meta-Game Story



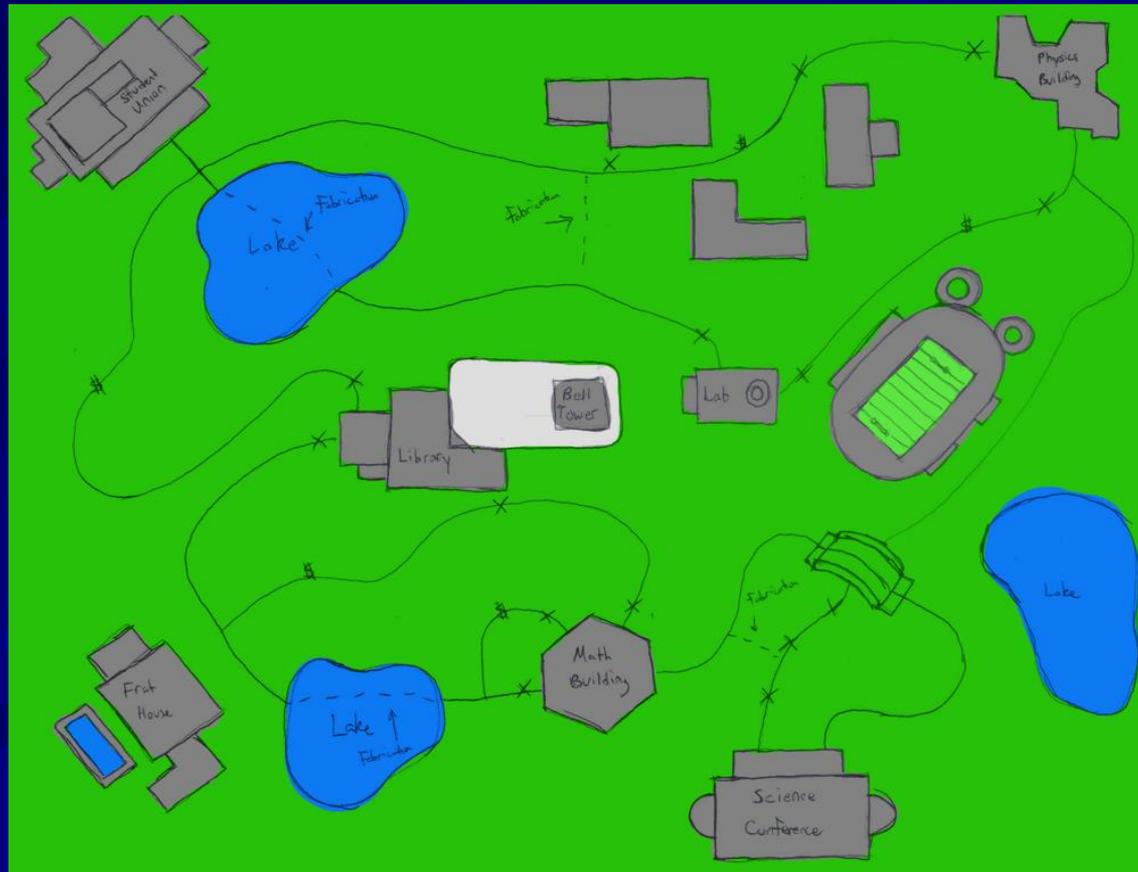
Design

Game 1 Design Metaphor



Design

Game 1 Design Metaphor



Design

Game 1 - Plagiarism Problems

- **Board game race against NPC opponent**
- **Plagiarism “quiz” scenarios hidden throughout the board**
- **Player is allowed to plagiarize, falsify or fabricate their positions on the game board.**
- **The amount a player engages in research misconduct increases their chance of getting caught.**

Design

Game 1 – Post-game Narrative

If the player cheats during the game, they will be “expelled” from school after the game in a narrative cutscene set in a mock tribunal room.

At the last minute however, the University Library’s Anti-Plagiarism Corps intervenes and asks the tribunal to stay the player’s expulsion if they help in the fight against plagiarism.

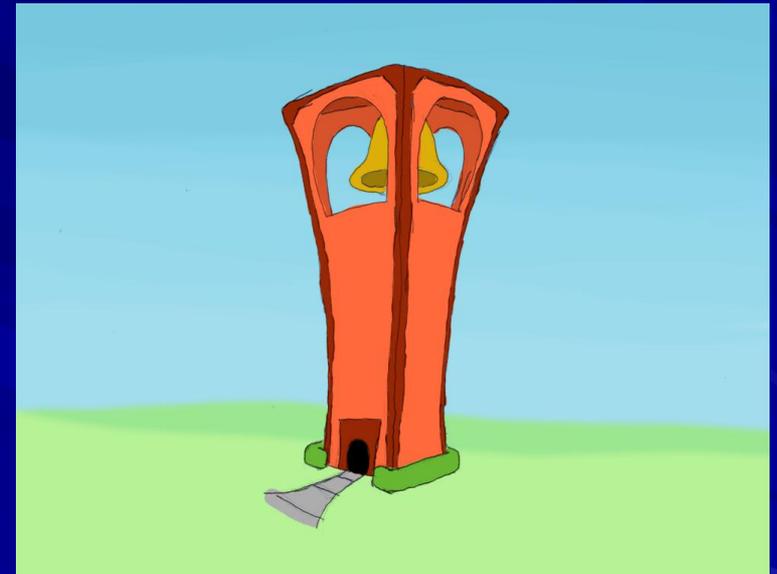
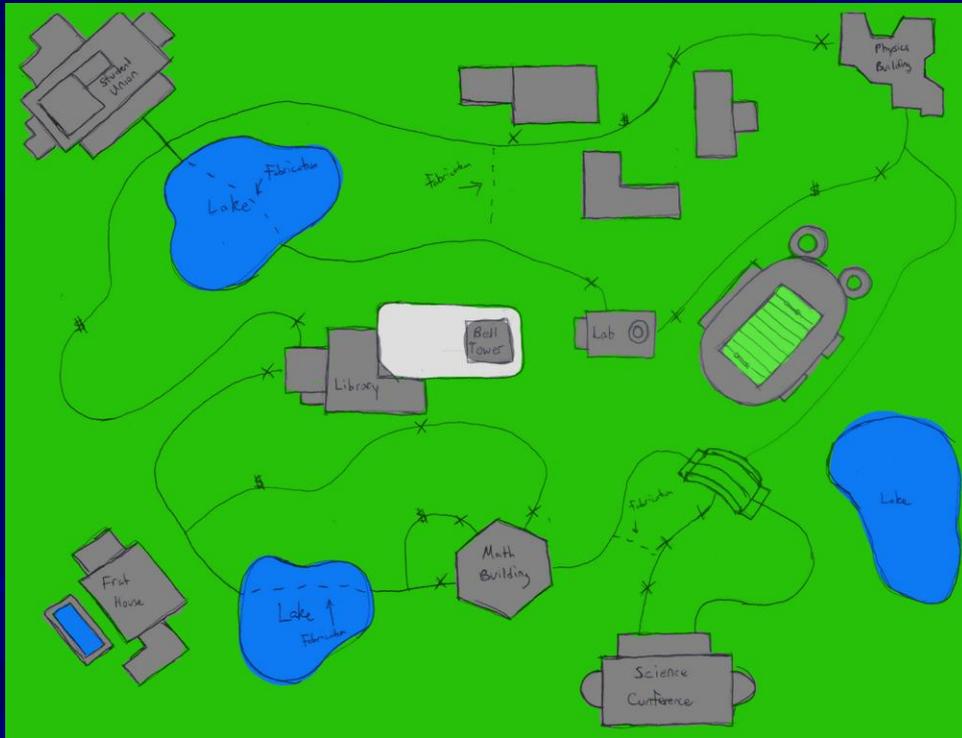
Design

Game 2 Design Metaphor



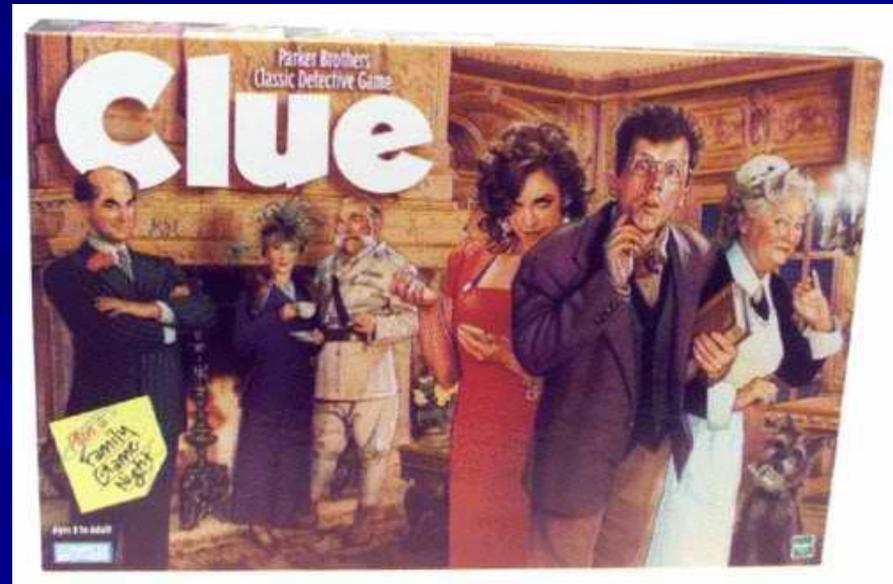
Design

Game 2 Design Metaphor



Design

Game 3 Design Metaphor



Development

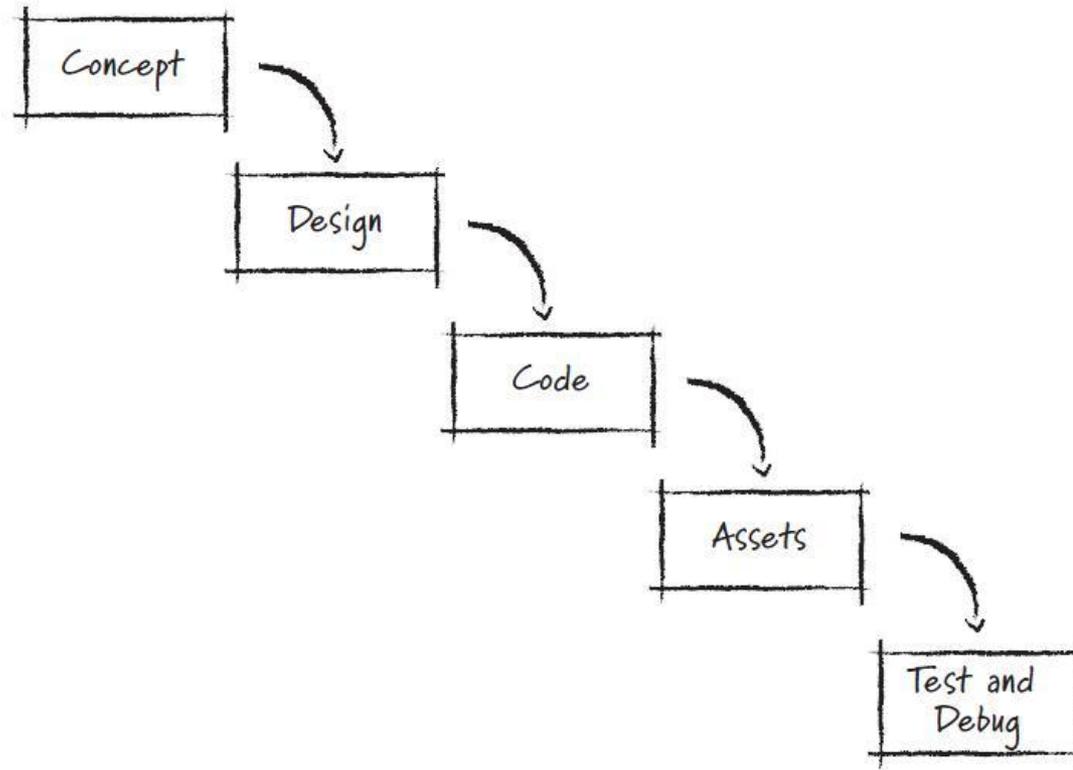


FIGURE 1.2 Waterfall game development

Development

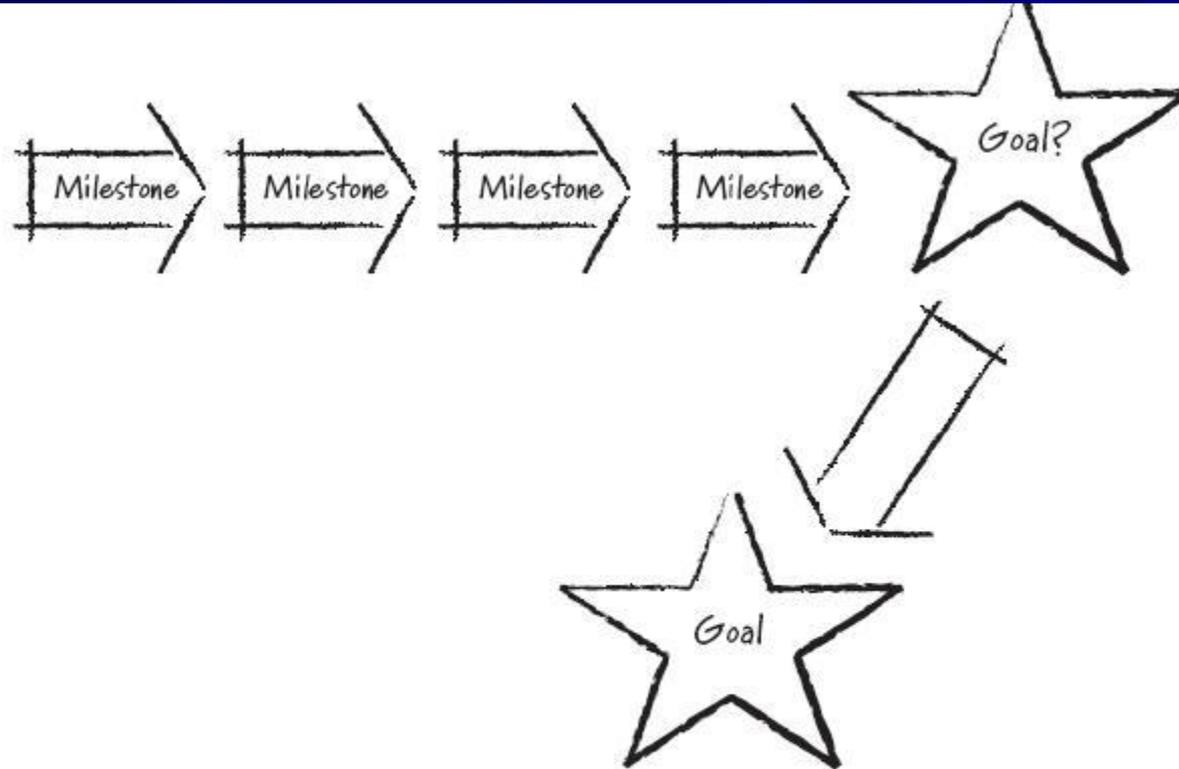


FIGURE 2.6 Milestone steps toward a goal

Development

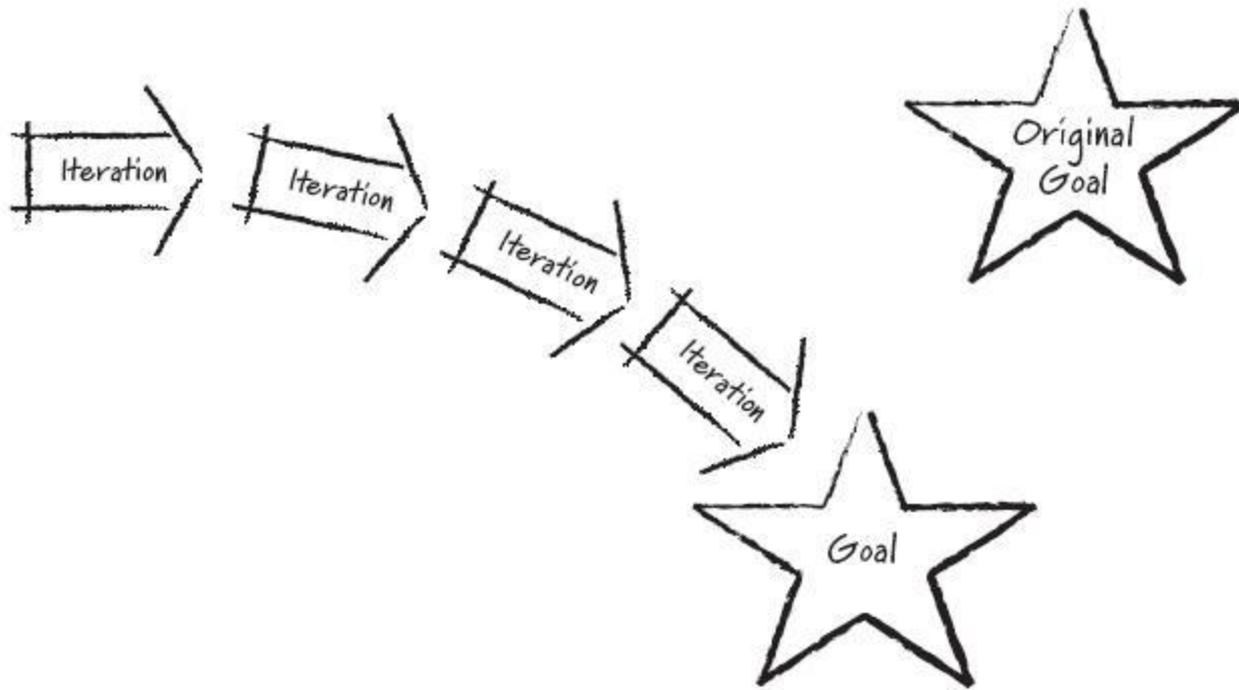


FIGURE 2.7 Iterations toward a goal

Development

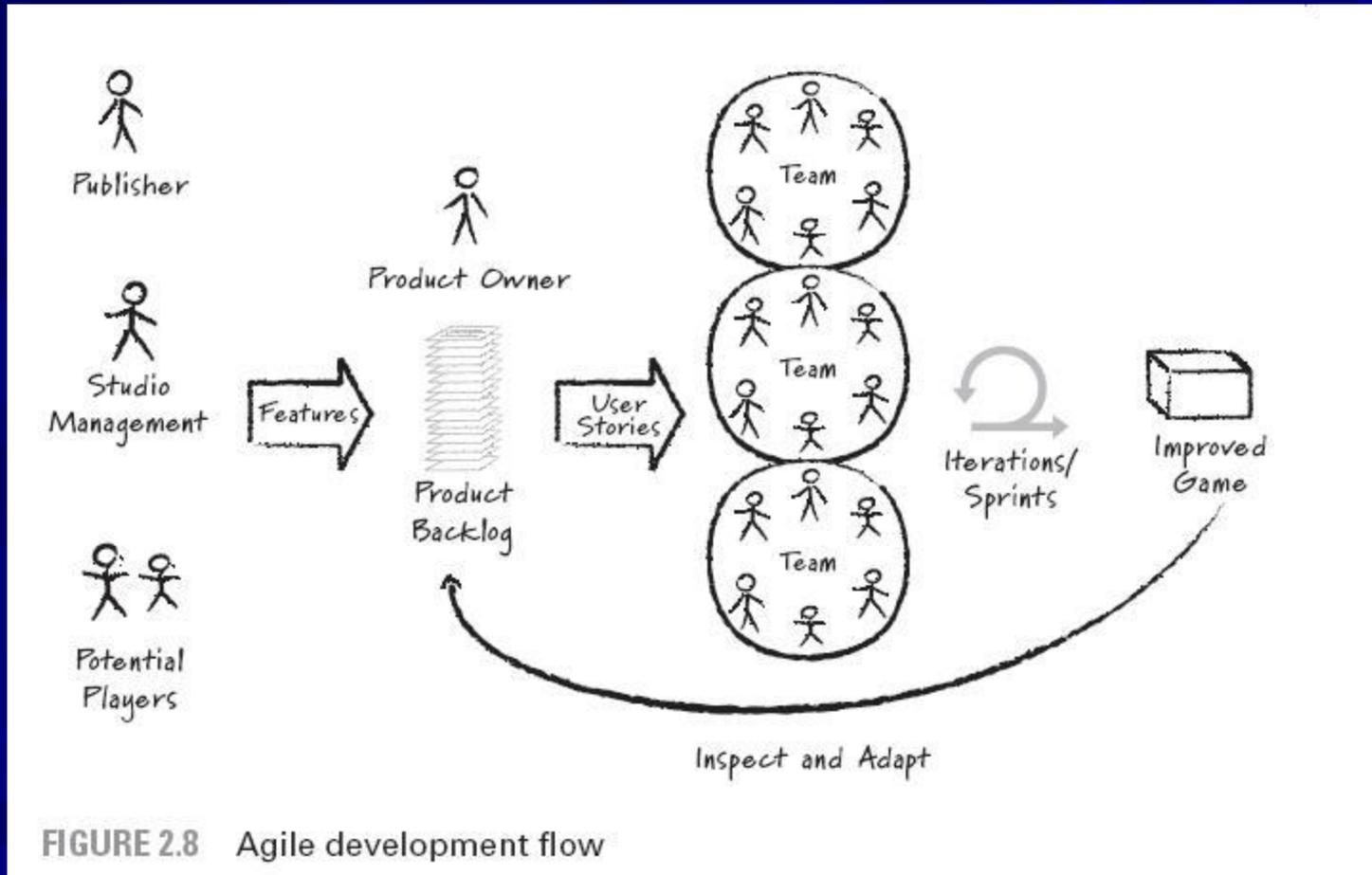


FIGURE 2.8 Agile development flow

Development

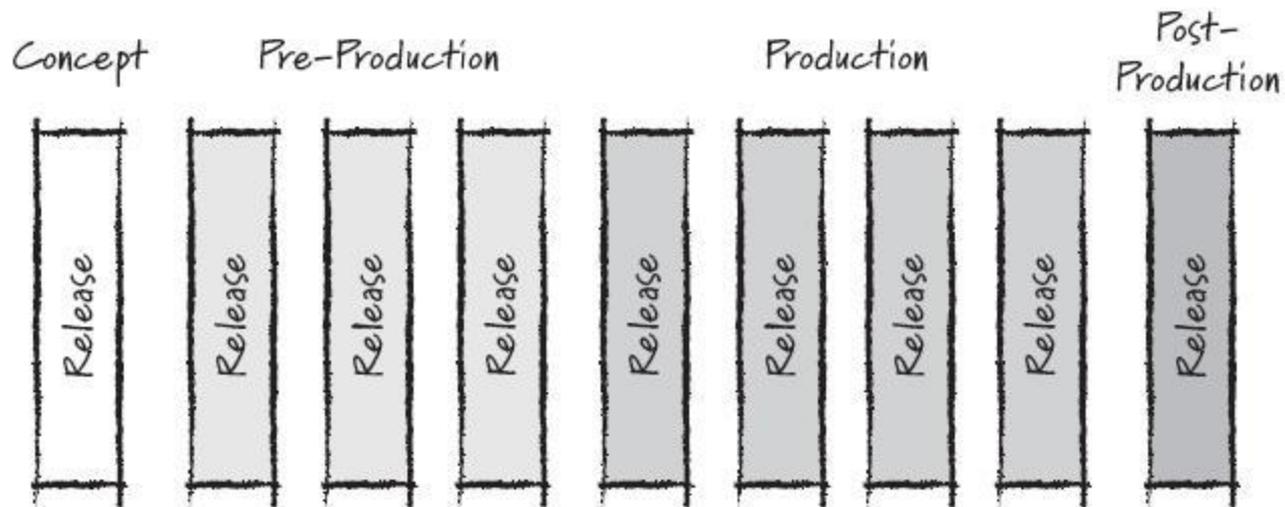


FIGURE 2.9 Agile project flow

Development

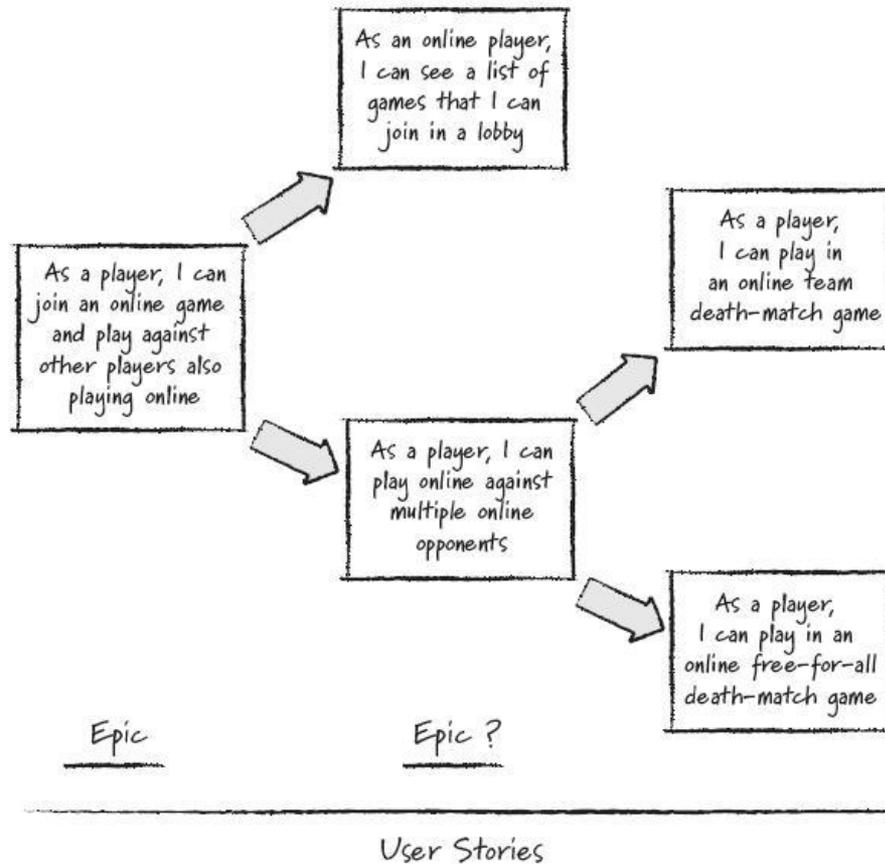


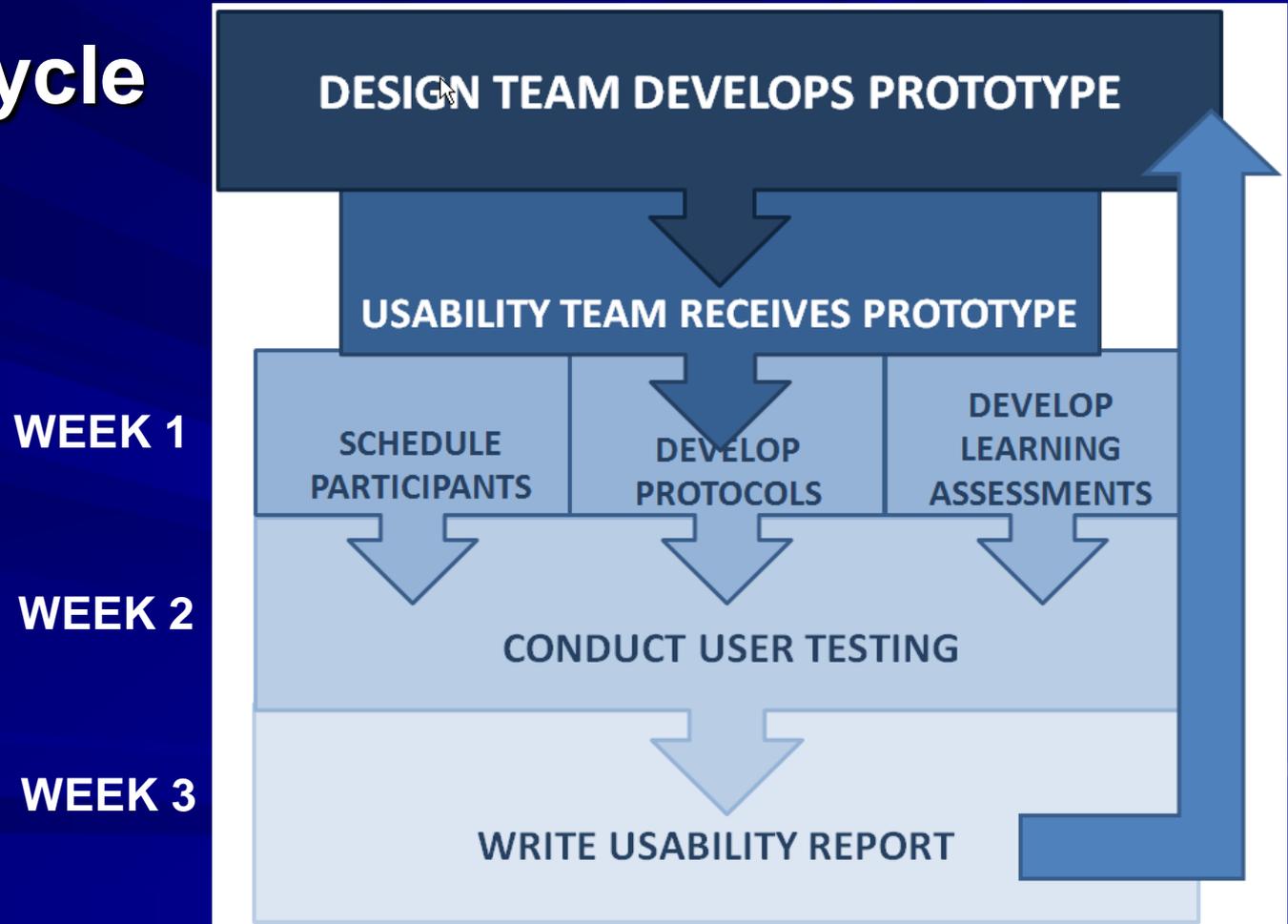
FIGURE 5.1 Breaking down an epic into smaller stories

Phase 3&5: Evaluation

- **Formative Evaluation:**
 - Usability Testing
 - Learner assessments of modules
 - Design assessments
- **Summative Evaluation:**
 - Overall project evaluation
 - Assessment of learning in game
 - Evaluation of objectives

Usability Testing

15 Day Cycle



Usability: Week 1

- **Schedule Participants**
- **Develop Testing Protocols**
- **Review prototype design**
- **Develop learning assessments, if applicable**

Usability: Week 2

Conduct user tests with 3-5 STEM students





Usability: Week 3

- **Prepare usability report**
- **Communicate successes/ shortfalls to GAP team**
- **Usability report informs further development**
- **Design team documents changes in future iterations of the game**

Phase 4: Implementation

- Six NSF-funded universities and one large state university have agreed to participate in beta testing of the GAP game.
- The game and learning assessments will be delivered to these institutions for testing during Spring 2012.

Purdue University

Virginia Commonwealth University

University of Central Florida

University of Houston

Loyola Marymount

Oakland University

Rowan University

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References

- “Great Content” graphic: <http://www.seibunkyo.org/>

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IIS EESE Grant 1033002*