



Antibiotic Apprentice



Jessica Austin



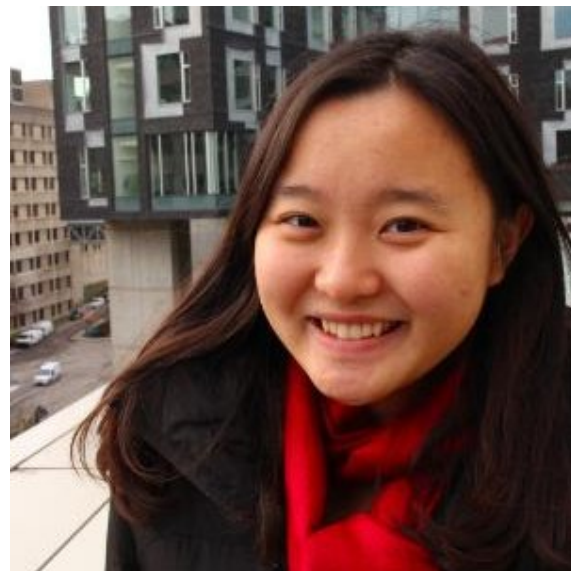
Master's Student in the Robotics Institute. RPG aficionado and our development specialist.

Martina Pavelko



Master's Student in Educational Technology and Applied Learning Science. Board game geek and former high school teacher.

Yujun Song



Master's Student in Educational Technology and Applied Learning Science. Fan of simulations and former industrial engineering student.

Educational Objectives

Core Objective

Help students learn to identify appropriate antibiotic therapy for treating an infection caused by a known bacterial agent.

Secondary Objective

Identify alternative antibiotic treatments in the case of resistant strains



Game Demo


Battle Mechanic



Game Descriptions - Basic Mechanics

Characters

Logan Medical Apprentice



LV 1 Current Exp 3

HP 100/100 To Next Level 27

MP 27/30

Talented apprentice under Master Telan. Curious, but sometimes a bit naive.

Events



HP 84/100
MP 21/30
1G

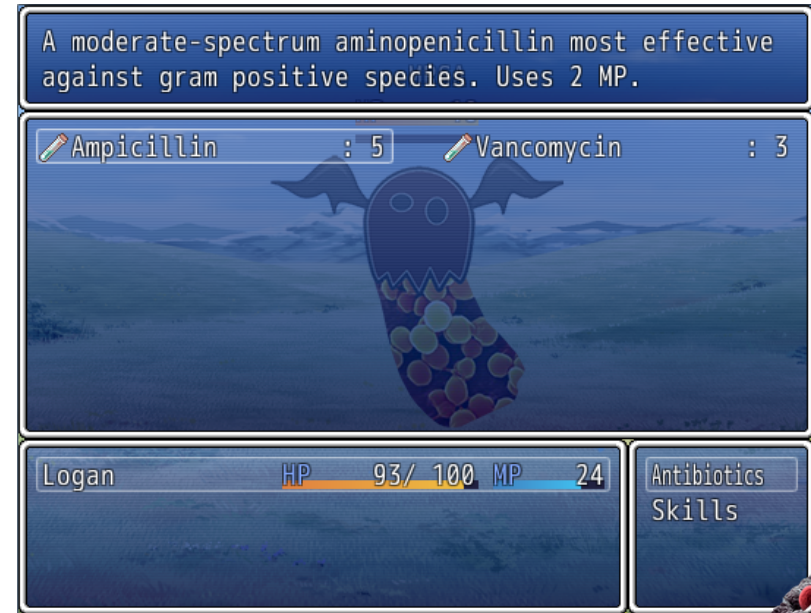
I'll leave immediately
Uh, I'm busy right now...

Limenas soldier
I have an urgent message from the King!
He wishes to see you right away!



Game Descriptions - Basic Mechanics

Battles



Game Descriptions - Basic Mechanics

Bug-Drug Interaction Table

	MSSA	MRSA	E. faecalis	Viridans Streptococci	E. coli (sepsis)	E. coli (UTI)	VRE	ESBL E.coli
Ampicillin	8	0	10	8	2	8	0	0
TMP-SMZ	8	8	0	0	0	10	0	0
Ceftriaxone	8	0	0	10	10	8	0	0
Ertapenem	8	0	0	8	8	8	0	10
Gentamicin	2	0	8	0	8	5	0	10
Levofloxacin	8	0	8	8	8	10	0	8
Linezolid	8	8	8	8	0	0	10	0



Game Descriptions - Basic Mechanics

Other

Training

Skills

Gold

NPCs

Treasure

Animals

A broad-spectrum 3rd generation cephalosporin.
Uses 3 MP.

Buy	Sell	Cancel	8 Gold
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<div><div></div><div>Amoxicillin</div><div>2</div></div> <div><div></div><div>Vancomycin</div><div>3</div></div> <div><div></div><div>Oxacillin</div><div>1</div></div> <div><div></div><div>Ampicillin</div><div>2</div></div> <div><div></div><div>Ceftriaxone</div><div>3</div></div> <div><div></div><div>Gentamicin</div><div>4</div></div>	<div>Possession</div> <div>1</div>
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Game Descriptions - Dynamics

- Wander about the village
- Interact with people and search for treasure
- Be caught off-guard by horrible monsters that appear and attack you
- Different playstyles



Game Descriptions - Intended Aesthetics

Fantasy

Narrative

Challenge

Discovery



Game Descriptions - Intended Aesthetics

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Game Descriptions - Intended Aesthetics

Fantasy

Narrative

Challenge

Discovery

Trimethoprim/sulfamethoxazole is used for mild to moderate infections and prophylaxis. Uses 2 MP.

 Ampicillin	: 8	 TMP-SMZ (Bactrim)	: 9
 Ceftriaxone	: 4	 Ertapenem	: 3
 Gentamicin	: 3	 Levofloxacin	: 2
 Linezolid	: 4	 Oxacillin	: 3
 Vancomycin	: 8		

Logan HP 93/100 MP 7

Antibiotics Skills



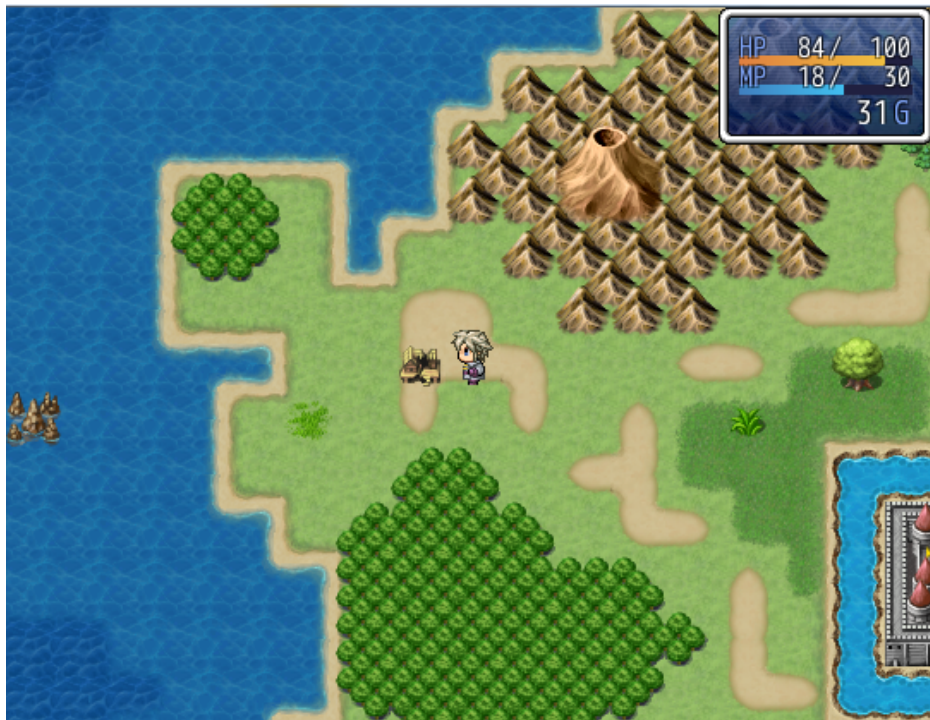
Game Descriptions - Intended Aesthetics

Fantasy

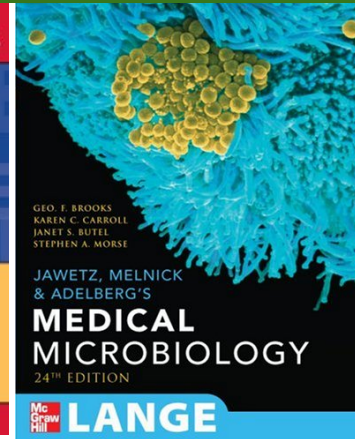
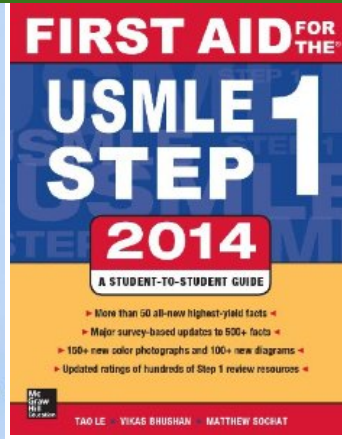
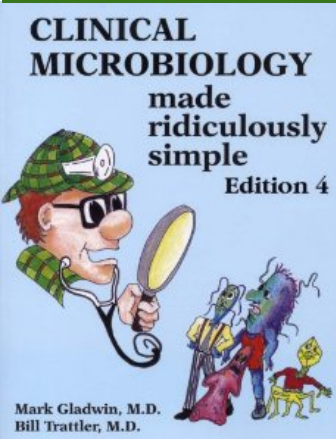
Narrative

Challenge

Discovery



Resources



Peter J. Veldkamp, M.D.

Doctor and Professor of Infectious Disease at UPMC

Greg Castelli, Pharm.D.

2nd Year Pharmacy Resident at UPMC

Michael Huijon, M.D.

2nd Year Medical Resident at UPMC



Cognitive Task Analysis

Expert Interviews

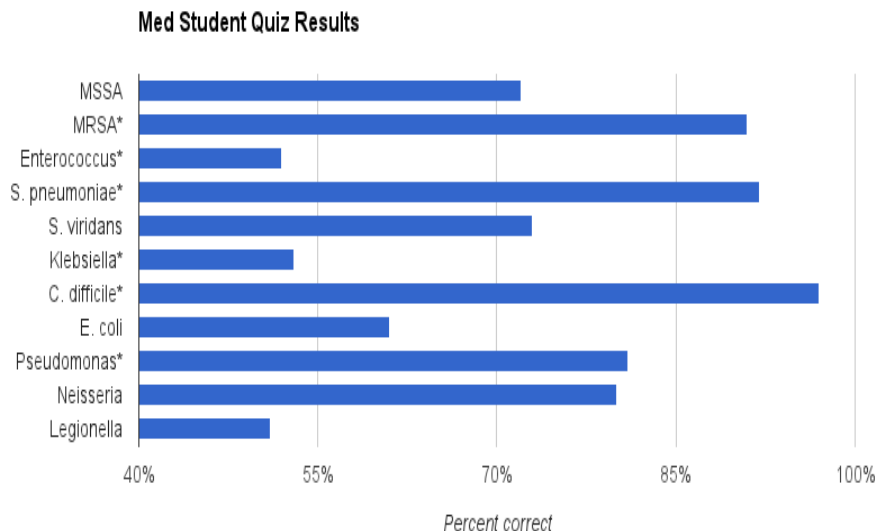
How does it inform our design?

- Revised the selection of bugs and drugs
- Revised learning objectives
- Revised bug-drug damage table
- The desirability of a particular antibiotic should be tied to the “damage points” scored against an enemy



Cognitive Task Analysis

Med Student Quiz (n = 70)



How does it inform our design?

- The sequence that bugs appear in the game is according to an increasing level of difficulty.
- Players get more experience points and gold after defeating a difficult bug.



Learning Principles

Practice/Application

Students receive sufficient practice by tying progress in the game directly to successful combat outcomes.

Immediate Feedback

The game provides players with immediate feedback in the form of information about the damage done to the monsters.

Error-Specific Feedback

Players can visit Crazy Larry's home, where they train with each of the five bugs in that particular zone and receive feedback on their choices.



Learning Principles

Mixed Practice / Spacing

Players encounter battles with different kinds of bacteria, which are scattered throughout the landscape instead of massed in one area.

Scaffolding

Battles are sequenced by an increasing level of difficulty. We support players with hints to fight with the final boss.

Pre-training

Optional training scenario walks players through a sample battle to acquaint them with the mechanics of battle and interface options



Play Testing - Round 1

Participants:

a CMU professor with little experience playing RPG

a CMU student who was very familiar with RPGs

Observations:

Initial tutorial with Master Telan is useful

Initial narratives are too long

Players were confused about the metrics HP and MP



Play Testing - Round 1

Changes:

- Shortened initial narratives
- Heads-up display show MP, HP, gold and level



Play Testing - Round 2

Participants:

a UIC 4th-year medical student

Observations:

Wandered around the town aimlessly

Guessed which drug to use in battles

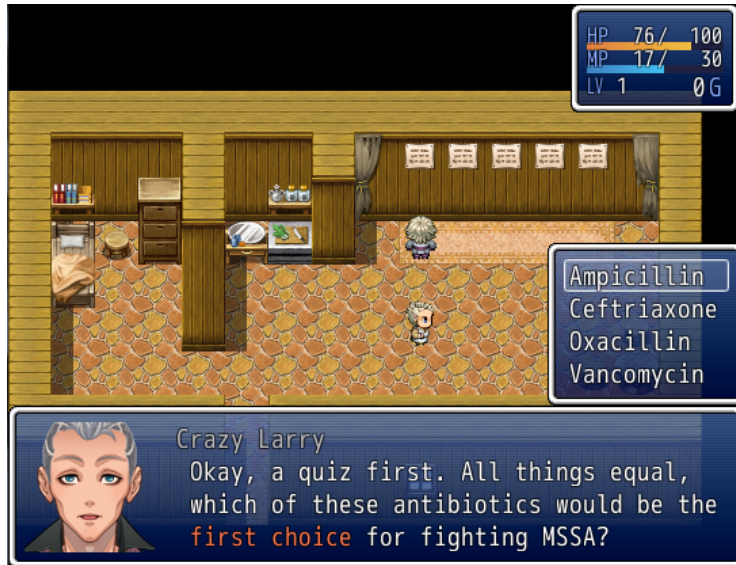
“I spent a lot of time wandering around and fighting, but not really learning about antibiotics.”



Play Testing - Round 2

Changes:

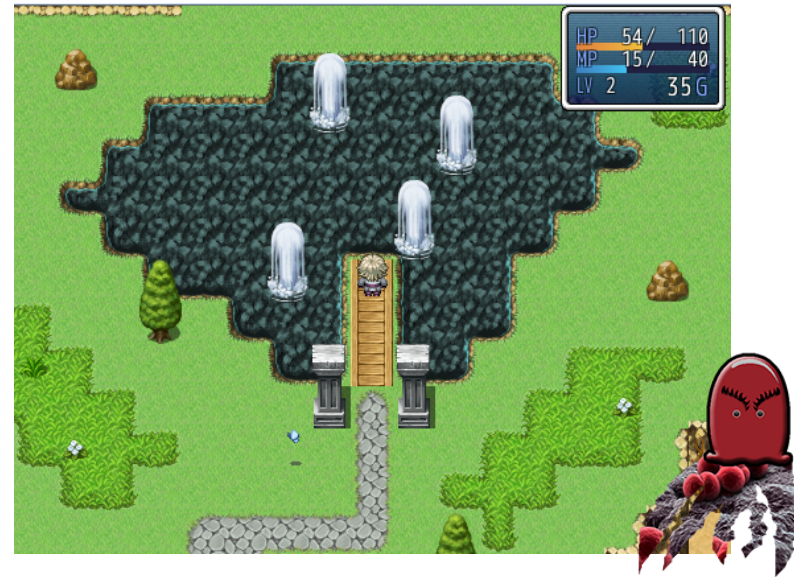
- Added the “Crazy Larry” training session in Squalorton.
- Added an optional “tutorial” at the beginning of the game.



Play Testing - Round 2

Changes:

- Updated the dialogue for all of the Squalorton characters
- Added a lot of “color” to the game: animals, regeneration scene etc.



Play Testing - Round 3

Participants:

2 UPitt medical residents

Observations:

Crazy Larry training session very well received

Redundant drugs as well as missing drugs in our table

Information about Gram+ and Gram- aspects of the bugs and drug is missing

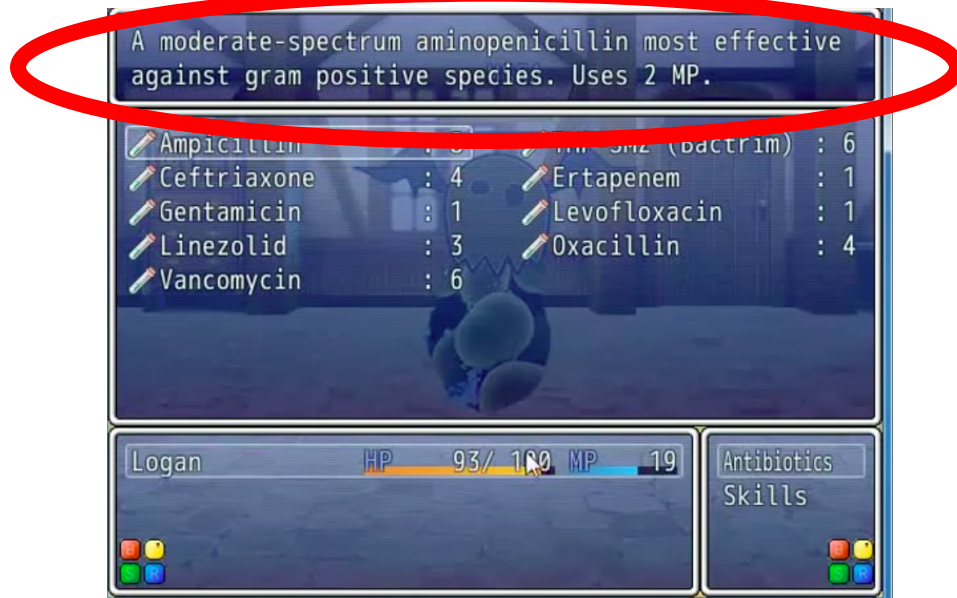
Players were confused about MP, and were stranded when running out of gold



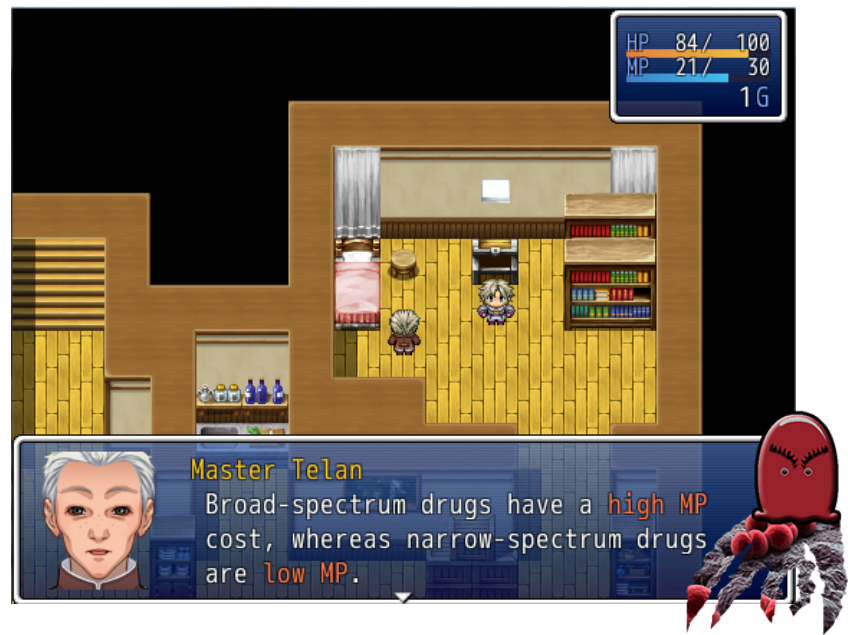
Play Testing - Round 3

Changes:

Fixed bug-drug table;
add information about G+ and G- bugs



Added MP hints and added golds after battles



Evaluation

Participant	Where are you in your medical career?	Have you ever played RPGs before?	How much time did you spend playing Antibiotic Apprentice?
1	Med school	What's an RPG?	15-30 minutes
2	Pre-med	Yes	30-60 minutes
3	Med school	Yes	15-30 minutes

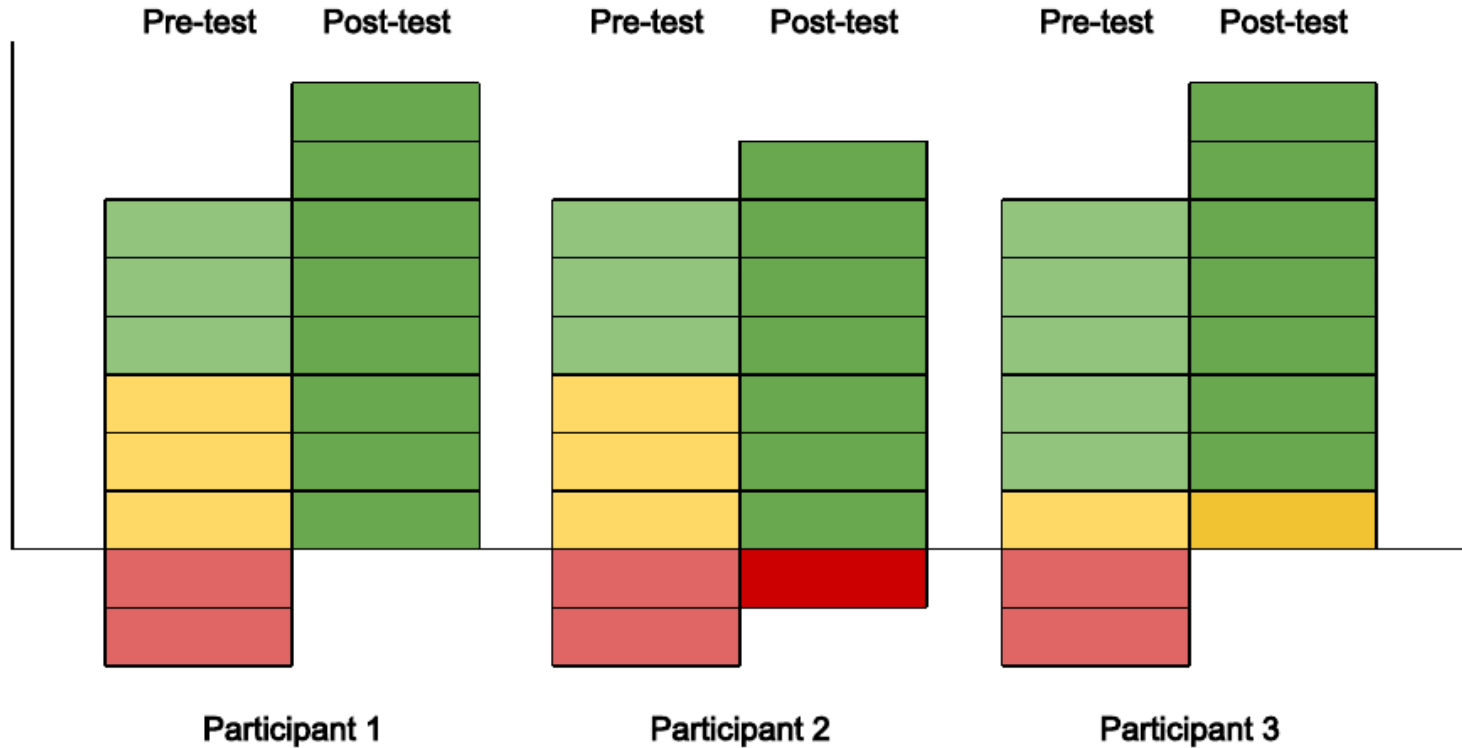


Evaluation

	I enjoyed playing Antibiotic Apprentice	Someone who doesn't play video games could easily learn how to play Antibiotic Apprentice on their own	Playing Antibiotic Apprentice before a USMLE exam would improve my score	Playing Antibiotic Apprentice would improve my ability to treat patients	I would recommend Antibiotic Apprentice to a friend
Participant 1	Agree	Strongly Agree	Agree	Agree	Agree
Participant 2	Agree	Agree	Neither agree nor disagree	Neither agree nor disagree	Agree
Participant 3	Strongly Agree	Agree	Agree	Neither agree nor disagree	Strongly Agree



Evaluation



Lessons Learned

What works well?

- External subject matter expert helped throughout our design and evaluation.
- Our game does help learners to memorize correct bug-drug pairings!
- Combat was an effective way for students to practice and receive feedback.
- Crazy Larry tutorial section of the game was engaging and educating.
- Collecting sparkly items was fun!



Lessons Learned

What needs to be improved?

- Find better ways to regenerate of medicine power (MP)
- Strike a good balance as to monetary resources
- Make the game more adaptive to players' decisions
- Create a more structured way of keeping track of game goals





Thank you!

