From Board Game to Digital Game: Designing a Mobile Game for Children to Learn About Invasive Species

Aishat Aloba[1], Gabriel Coleman[1], Triton Ong[1], Shan Yan[1], Dehlia Albrecht[2], Marko Suvajdzic[1], Lisa Anthony[1]

[1]University of Florida, [2]University of Florida Center for Aquatic and Invasive Plants

1. Background

Invasive species are **non-native species that cause ecological**, **environmental**, and/or **harm to human health** [1]. Examples are shown below.

(Left) Water Hyacinth. (Middle) Hydrilla. (Right) Iguana [2].

These species are **difficult to control** because they grow and reproduce rapidly.

2. Lakeville - The Educational Classroom Board Game

The UF Center for Aquatic and Invasive Plants designed a **collaborative role-playing game** (below) for children to **differentiate among native**, **non-native**, and **invasive** species, and to understand how their decisions affect the virtual Lakeville environment.

(Left) Organism Role Card for playing organisms. (Middle) Citizen Role Card for playing citizens. (Right) Wheel of Focus for choosing the next organism to be role-played [2].

Knowledge-Based surveys showed that children gained a **28.5% increase** in knowledge about invasive species (see table below).

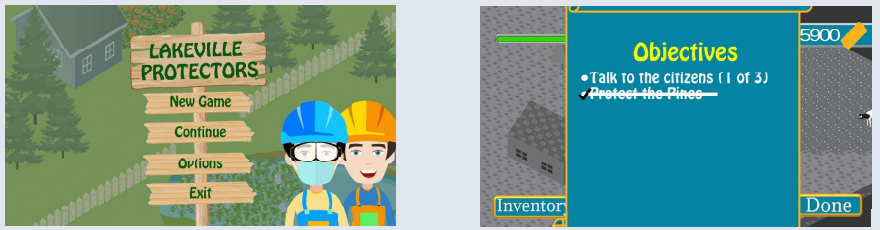
Elementary/Middle School Evaluations of the Board Game

Years	Avg. Pre-test Score	Avg. Post-test score	Avg. % increase
2013-2014	44.1/61.3	54.7/70.3	28/26
2014-2015	56.6/64.3	70.3/78.0	26/22
2015-2016	47.8/51.5	60.5/72.7	28/41
Total			**27.33/29.67**

Created a mobile game, Lakeville protectors, to address the board game's **limitations** of being **inaccessible outside the classroom**, and **not teaching** children about invasive species' **control mechanisms**.

3. Lakeville Protectors - The Mobile Digital Game

We designed a **resource management strategy game** (below) for children to understand mechanisms used to **control invasive species**, in addition to the board game goals.



(Left) Lakeville Protectors Main Menu. (Right) Lakeville Protectors Objectives.

The player must gather information about the problems affecting Lakeville by **consulting with citizens** (below), and hiring researchers to investigate the appropriate mechanisms (**chemical**, **biological**, **physical**, and **mechanical**) needed to control invasive species.

(Left) Consulting with an Angler. (Middle) Farmer. (Right) Land Developer.

Tutorials, **feedback**, and **replayability** are used to enhance learning in the game.

Streamlining game objectives and **promoting guided play** are important design guidelines for creating digital games that address real-world problems.

A **limitation** of the game is that as a single-player game, it **does not promote classroom collaboration** so **future work** will make the game a **multi-player game**.

The **effectiveness** of Lakeville protectors in **increasing children's knowledge** about invasive species will be studied in a **future work**.

4. Acknowledgements

Partial funding for this project was provided by the University of Florida/IFAS Center for Aquatic and Invasive Plants, University of Florida College of the Arts, and University of Florida Digital Worlds Institute. Gamification of Environmental Education Curriculum Award.

5. References

1. Center for Invasive and Aquatic Plants. 2017. Non-native Invasive Plants –An Introduction. Retrieved January 1, 2017 from http://plants.ifas.ufl.edu/manage/why-manage-plants/non-native-invasive-plants-an-introduction/.
2. © University of Florida|IFAS Center for Aquatic and Invasive Plants. Used with Permission.