







(a) Start of the game. Normal water flow with full Happy Index.



(c) Money earned and Happy Index remains high by keeping flood plains safe.



(b) Flooding takes place with warnings given. When sad faces appear, the Happy Index is lowered.

Figure 2. Snapshots of “Flood Protection” game’s Storyboard

## Validation

To ensure the content in the game and the booklet is coherent and accurate, advisers have reviewed our games throughout the developmental process (Figure 2). Our advisers are professors and experts from various disciplines; these include but are not limited to water pollution, green economics, water footprint, water management, architecture, civil engineering, and education. The content in both the game and eBook has been reviewed via individual interviews as well as an expert forum.

The expert forum allowed the experts to discuss ideas of how to improve the educational tools. Giving the experts an opportunity to discuss amongst themselves may increase chances of generating new and more ideas as opposed to individual interviews. All advisers expressed great hopes for the project and commented that the

educational tools developed are suitable for secondary school students in terms of style and content load.

The experts made several suggestions to improve the concept that’s to be transmitted from the game. They suggested adding the concept of water rights and green economics to show the difficulty of balancing the residents’ safety and a city’s economy. They also suggested adding more clues and information in the digital game to guide the students when using the tool and considering incorporating other secondary topics such as water pollution.

Aside from the content of the game and eBook, to ensure the tools are user-friendly, our team members gather on a biweekly basis to test the tools and give feedback. The tools were also tested by our advisers during the expert forum and will be tested again during a pilot study in January 2013 by secondary school students from different Taipei schools.



(a) Meeting with expert reviewer Chang-E Zhou from Taiwan Institute of Economic Research on September, 2012.



(b) User test during the expert forum held on November, 2012.

Figure 3. Content validation and user test

## Implementing Game-initiated Learning

Once re-adjusted after the first pilot study, the digital game and eBook will be used during a one-day study at Huwei Junior High on February 2013. The study will begin by dividing the students in two groups; one group will undergo Game-Initiated Learning while the other group will undergo traditional learning. Students will be further divided into groups of 3, where students will take turns to play while the others observe and discuss. The Game-Initiated Learning model consists of first emotionally engaging the students by playing the digital game. A dimension of competitiveness will be added as students will be asked to complete the tasks in the game in the least time possible, keeping students actively engaged. The students will then proceed to discuss and share thoughts that may have arisen. And lastly, the students will be given

the eBooks to browse through information. By allowing students to inquire by themselves, information is more likely to be retained as opposed to being spoon-fed through a traditional lecture.

## Summary

The primary objective of the project is to develop an interactive game for high school students for two main reasons; to validate the efficiency of Game-initiated Learning for water-related issues and to meet the need for disaster education in Taiwan, which has been a growing concern for the island. Our educational content is set at a high-school level due to an observed predominant gaming culture amongst teens in Taiwan; especially in urban settlements.

As part of the developmental process, game proposals, paper prototypes, storyboards have been completed and

programming has taken place, via Adobe Flash. A draft of the eBook has also been produced with the program iBook Author; the eBook is currently only accessible via an iPad.

To ensure development for both the game and the eBook move at the same pace, the project's team congregates on a biweekly basis to test both education tools as well as to exchange ideas. The content of both tools has been reviewed by external advisers, who are experts in the field of water governance. Experts have reviewed the tools individually as well as collectively through an Expert forum held in 2012.

The game and the tool will be used during a short pilot study with high school students from various schools in Taipei and a one-day study with Huwei Junior High, a secondary school based in southern Taiwan. Such studies are necessary in order to obtain direct feedback from the targeted users so that the tools may be improved.

We expect this ongoing project to become sustainable in years to come in that both interactive tools will continue to upgrade as studies, such as the one scheduled at Huwei, will continue to run annually. We also hope to have the educational tools exhibited at public spaces, such as Taiwan's National Museum of Science, to make them accessible to the public.

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