Enabling Educators to Customize the Game Environment

Mark Stenerson, William Schneller, Eve Syrkin Wurtele
Iowa State University VRAC, 1620 Howe Hall, Ames, IA 50014
msteners@iastate.edu, willschneller@gmail.com, evewurtele@gmail.com

Abstract

In the field of educational gaming, a lot of attention has been given to the delivery of educational content and how content is integrated into interactive and entertaining game play. For instance, Gee (2007) concludes that "…in video games, unlike in novels and films, content has to be separated from game play…"

With this in mind, we, the developers of the biology game *Meta!Blast*, have begun integrating a series of features into our game that will enable educators to customize the in-game experience and tailor it to their lesson plans. It is our belief that these features will not only enable teachers to optimally utilize our game in their classrooms, but also allow students to become more engaged in the game.

Most research involving educational games and the classroom focuses on the design of games and how students benefit from and accept games as a part of their educational development. While this is an important hurdle in integrating games with the classroom, a teacher's acceptance of the game can be an even bigger problem (Egenfeldt-Nielsen, 2004). If a teacher is unable to efficiently and effectively use the game in their classroom, what incentive is there for them to use the game at all? Why should they shape their curriculum around a game that doesn't allow them to teach the way they want to teach?

In truth, a teacher shouldn't have to shape their curriculum around an educational game. It would be better if the game could be augmented and shaped in order to fit into the curriculum. Since it is unrealistic to expect an educator to learn how to modify game code and art assets, the responsibility falls to the game developers to make this possible. But is this really feasible? The educational gaming world is full of papers that go into great detail about the careful planning required for the development of games targeted for use in the classroom (Dondlinger, 2007). Arguably, the biggest problem that educational game developers face is how to integrate content into game play so that the student is not only engaged in play but is also learning the content.

Such considerations lead to the question: *can game play and game content be separated in such a way that allows educators to modify game content without having to modify game play?* To address this challenge, we explore the differences between game play and game content. A clear understanding of these two key aspects of game development will enable an approach to the design of a system that will not only meet the needs of educators, but will also allow them to easily achieve their goals.

Game Content versus Game Play

There are some scholars that make the claim that "one feature of all good educational games is a marriage of form (game play) and content" (Fortugno & Zimmerman, 2005). Others conclude that "…in video games, unlike in novels and films, content has to be separated by game play…" (Gee, 2007). If we are going to allow educators to modify game content, we need to first look at the differences between game play and game content to understand if it is possible to change one without changing the other.

The term game play has many different definitions and interpretations. For instance, Björk and Holopainen (2005), define game play as "the structures of player interaction with the game system and with other players in the game" whereas Lindley et al. (2008) defines game play as "the experience of interacting with a game design in the performance of cognitive tasks, with a variety of emotions arising from or associated with different elements of motivation, task performance and completion." As the list of definitions for game play grows, one unifying theme seems to arise: interaction. Almost all of the definitions of game play either mention a player's interactions with the game or allude to game play being tied to what the player experiences in the game. Therefore, we could create a short definition of game play as being "the interactions that the player has with the game".

The website Dictionary.com defines content as "something that is to be expressed through some medium, as speech, writing, or any of the various arts." Simply put, content, in regards to an educational game, can be considered "what the developers of the game are trying to teach to their audience via their game".

Thus, if we view game play as the interactions that the player of a video game has with the system and we view the game content as the information that we are trying to convey to our player, then we can hypothesize that game play and game content should be independent of each other. In fact, Gee (2007) contends that "content in a game sets up, but does not fully determine, game play." The example that Gee gives involves the controversial game *Grand Theft Auto: San Andreas*. While it is not viewed as an educational game in the traditional sense, Gee points out that the content of *Grand Theft Auto: San Andreas* involves concepts like poverty and crime and the game play involves problem solving situations like evading cars as you ride a bicycle through town in order to get somewhere safely. He concludes that if one were to change the game play by taking pictures of people rather than killing them, the problem solving aspects and difficulty of the game would be relatively unchanged.

Meta!Blast – From Preaching to Practice

Meta!Blast (www.metablast.org) is a real-time 3D action-adventure game designed for high school and college level students that puts a player inside a virtual plant cell. By immersing players into such an environment, the developers of Meta!Blast hope that players will come to a greater understanding of the cell than they could learn from traditional diagrams and textbooks (see Figure 1). The current demonstration version of Meta!Blast allows players to travel around the cell in their "bioship" and answer an assortment of thought provoking questions stored in data capsules that have been scattered throughout the cell (see Figure 2).

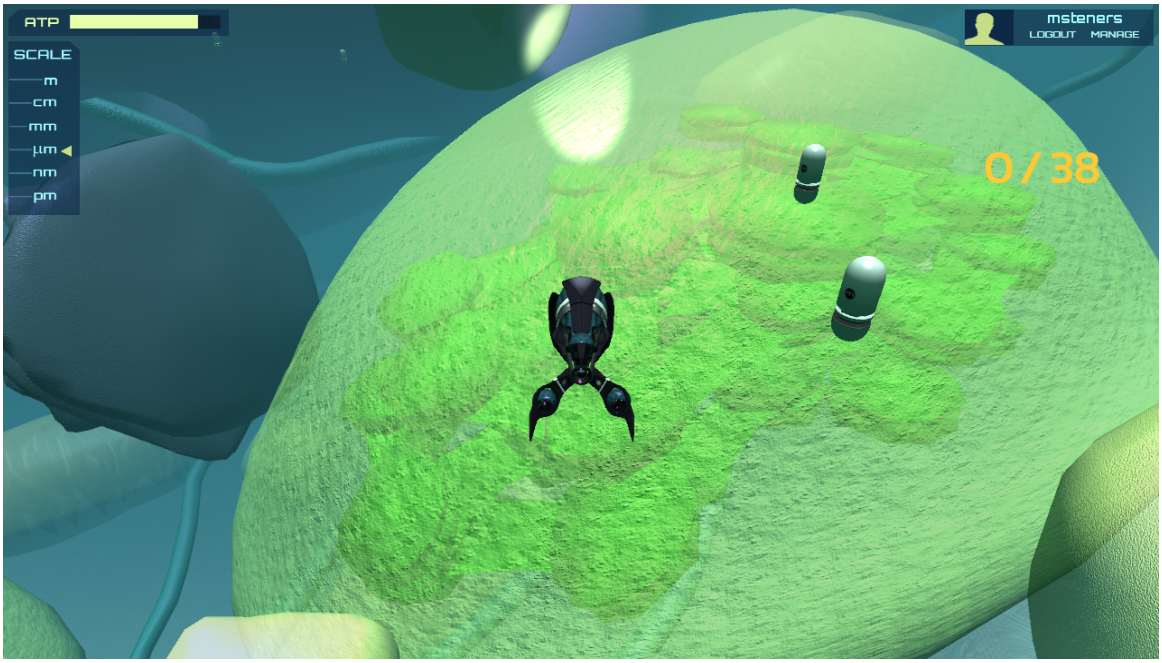

Figure 1: **A snapshot of Meta!Blast at the cell level. Players can shrink down to smaller sizes to see more complex processes.**

When reflecting on our definition of game content, we can clearly see that the content of Meta!Blast is primarily centered around plant cell biology. One consideration for the demonstration version of Meta!Blast was how to deliver more complex and vocabulary-rich content than what would be provided to the player by simply flying through the cell. One possibility was to design Meta!Blast to be paired with a textbook that players could reference when they wanted more in-depth information about a specific biological concept. However, this would require creating and providing the students with such a textbook. In addition, the "flow" of the game would be disrupted if a student had to continuously reference a textbook while playing. Flow, as defined by Csikszentmihalyi (1990), is "the state in which people are so involved in an activity that nothing else seems to matter." As developers of an educational game, we felt that it was more important for our players to be involved in the interactivity of our game without the reminder that they are, in fact, learning. Therefore, we decided to create the BioLog, a virtual in-game database that would allow students to click on objects in the cell and find more detailed information about their environment without taking their focus off of the game (see Figure 3).

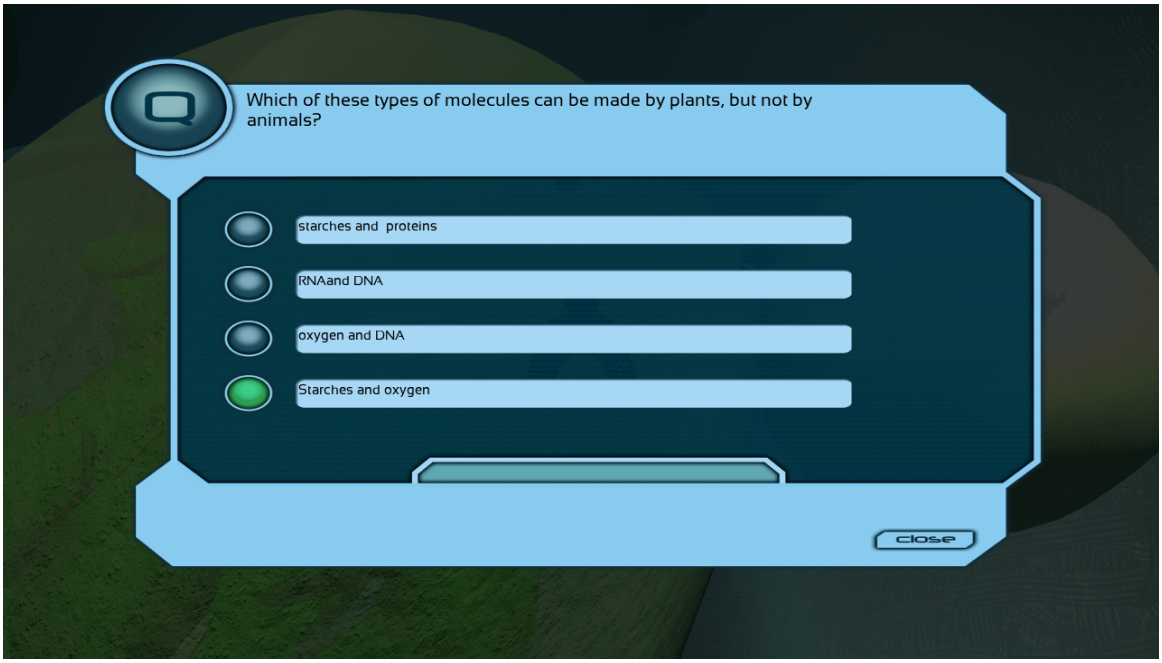

Figure 2: **An example of an in-game question**

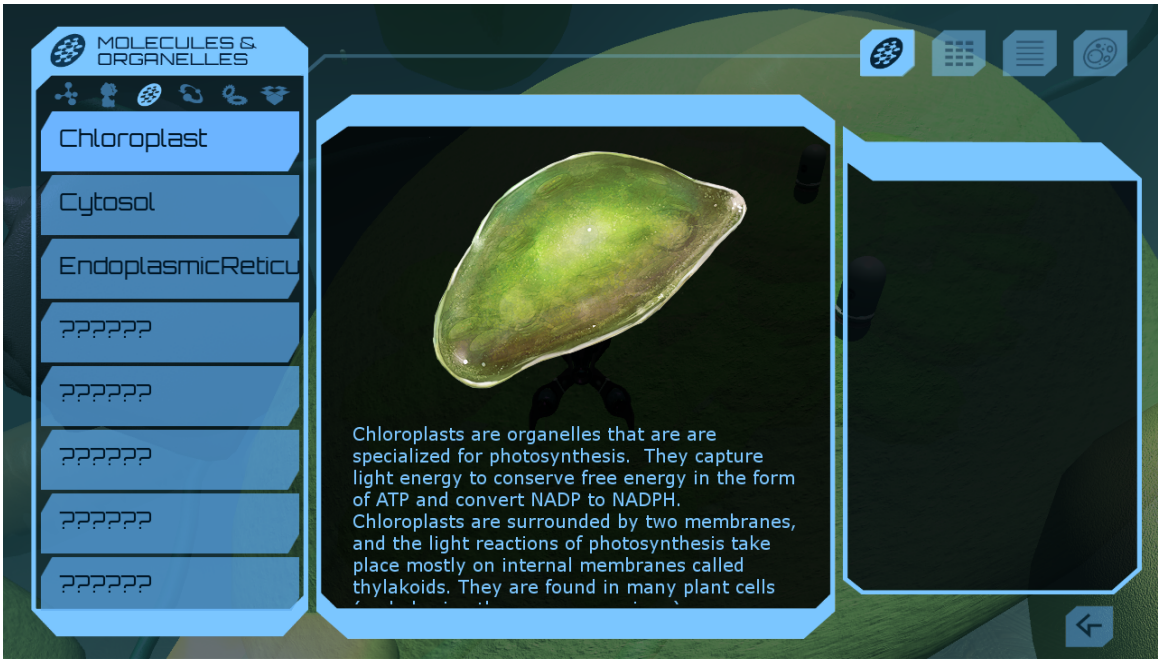

Figure 3: **This player has just clicked on a chloroplast and has received information about its function.**

Since we didn't want our players to be dependent on a working internet connection, the contents of the BioLog are stored on each player's computer in a text file and loaded into the game when the game begins. Through a prototype, custom editor that is included with the game (see Figure 4), teachers are given the ability to create, edit, and in some cases, delete BioLog entries, thereby allowing the incorporation of curriculum-specific information into the game.

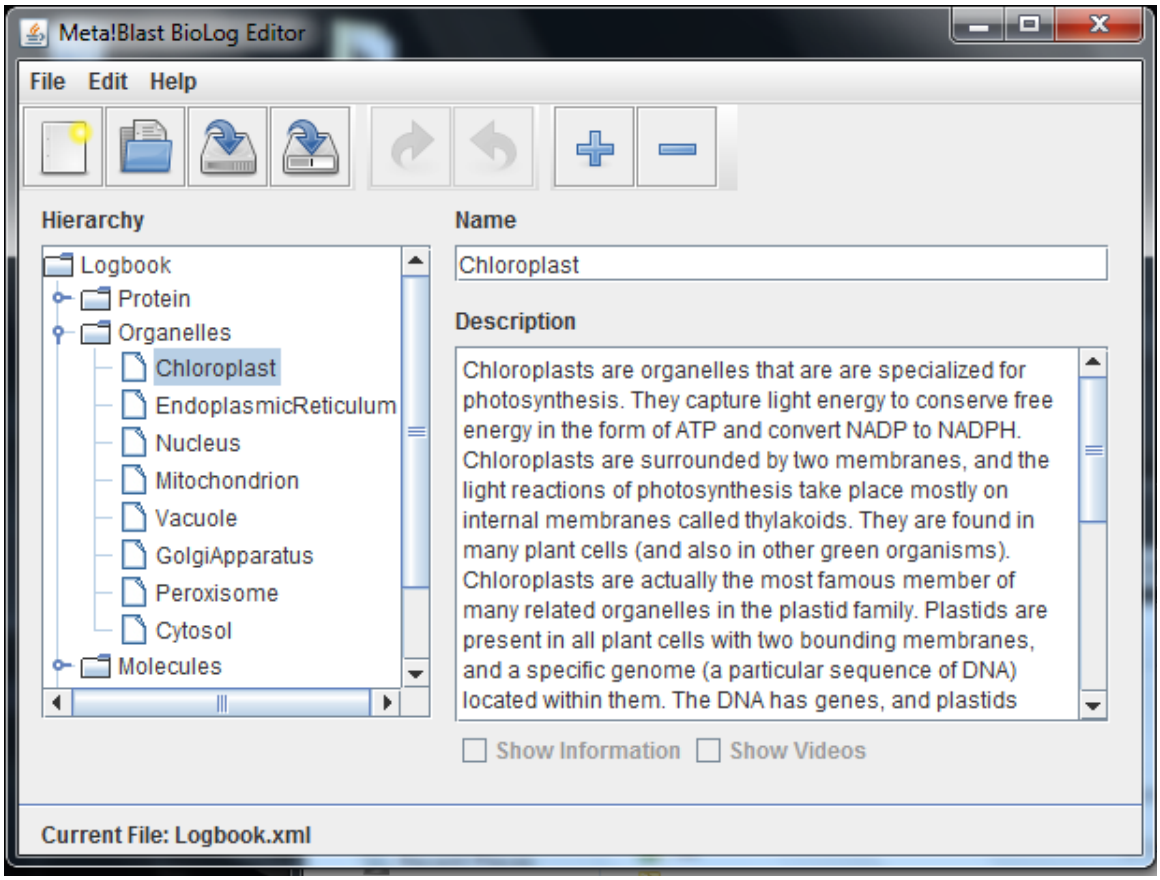

Figure 4: The BioLog editor allows educators to modify the contents of the in-game BioLog.

While further classroom testing and additional interface design needs to be done, initial reactions to the BioLog editor have been encouraging. Not only does it allow teachers to add more information to our game in an effort to provide information on more complex concepts of biology, it also allows teachers to simplify the information in order to use Meta!Blast with students that are younger than our target demographic.

Looking Forward – Teacher-Centered Design

It is clear that, without teacher approval and support, it is going to be difficult for games to thrive in the classroom (Egenfeldt-Nielsen, 2004). Teachers bridge the gap between educational game developers and students, our target audience. While they don't necessarily need to be good at playing the game, educators do need to be able to use the software in such a way that it augments their curriculum without being too complicated and cumbersome.

The growing field of human-computer interaction provides an approach to the design of software that has been dubbed *user-centered design* (Usability Professionals' Association, 2011). User-centered design is an iterative process of designing a software interface in which the target audience plays an active part in the design process. The goal is to create an interface that will allow the target audience to optimally use the software with as little training as possible (see Figure 5).

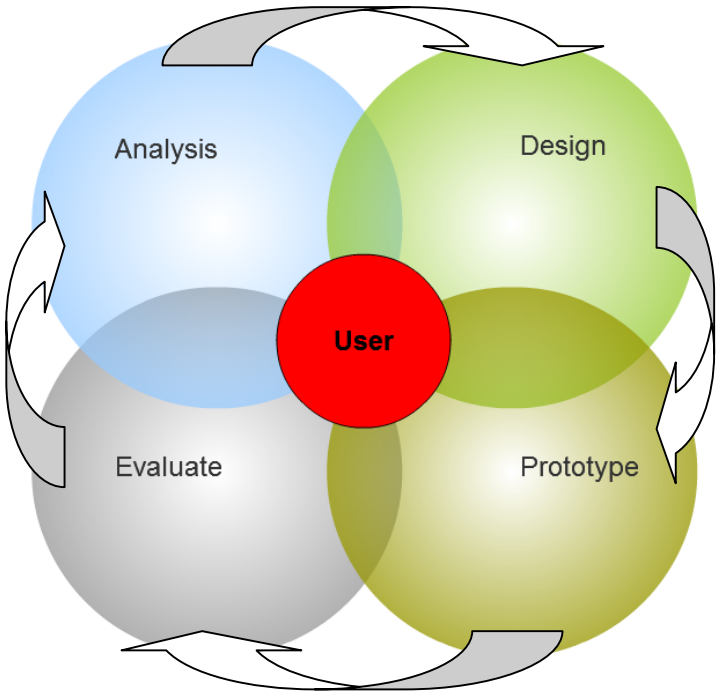

Figure 5: **A simple diagram outlining the four key steps of user-centered design. The user of the software plays an active role from task analysis to the evaluation of the prototype. The cycle continues until the user can efficiently use the software to complete their task.**

As educational game developers, we should explore the concepts and benefits of teacher-centered design in features of our games that teachers will interact with. Additionally, we need to further pursue the idea of separating some of the game content so that teachers can have the ability to modify the game through a well designed, teacher oriented interface. By doing this, we will eliminate a key obstacle in the integration of games into classrooms.

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Acknowledgments

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