ISLT 9410 – HCI Doctoral Seminar
Immune Attack Research Proposal

Submitted by Carla Bates and Carol Smith
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Immune Attack's My Personal Learning Assistant

I. Research Objective

This research study will evaluate whether proposed modifications to *Immune Attack*, an educational computer game, will raise a player's motivation level and degree of personal engagement with the game. If a user's enjoyment level and interactivity with educational material increase concurrently during game play, implications are positive for improved informal learning.

The enjoyment level of *Immune Attack* game players will be measured using a survey instrument designed to test key motivational heuristics associated with both game narrative and game play.

II. Background

Immune Attack

Immune Attack is an educational video game designed to teach middle school, high school, and freshman-level biology students the basic concepts of human immunology. Employing a first person shooter perspective, the player navigates a nanobot through a person's body, completing missions to detect bacteria and attack infections using defensive immune cells.

Immune Attack is currently in its first release (v. 1.0), and developers are considering ways in which to improve the game's second version. One aspect of the game identified for improvement is the My Personal Learning Assistant component. This game feature is intended to help players build their comprehension of immunology terms, but is not

sufficiently integrated into game play. Users can currently complete the game without being required to access or master content in the Personal Learning Assistant.

The developers of the game have proposed design changes to address this issue. The suggested improvements encourage the user to access the Learning Assistant component (renamed "Mission Intel") in order to learn strategies for earning more game points. These strategies reflect core principles of immunology, in order to support learning of immunology vocabulary and processes.

Game programming is costly and the project's fiscal resources are limited; before commissioning these proposed changes, therefore, the developers wish to evaluate whether or not the proposed changes will result in improved informal learning.

Motivational Heuristics

Motivational heuristics are a key factor in the success of educational computer games. Informal learning is more apt to take place if a user finds an e-learning game to be immersive, interactive, and challenging. The "fun factor" of educational software has been explored extensively, and is often cited as the most critical element of games designed to support learning (Ang & Rao, 2008, p. 182).

Contemporary computer game theory has explored multiple aspects of motivational heuristics, including the role of game play (ludology) and storyline (narratology). Unfortunately, both areas of study have often produced contradicting conclusions (Ang & Zaphiris, 2006). In an effort to reconcile these two dimensions of game theory, Ang & Zaphiris (2006) proposed a "theoretical framework for e-learning" that aligns both ludology and narratology as complementing aspects of enjoyable games.

A survey instrument based on this framework was recently designed in order to assess the motivational heuristics of educational computer games (Ang & Rao, 2008). The survey questions elicit feedback regarding players' engagement and enjoyment levels, as well as their assessment of both the narrative and game play aspects of the game.

This study will apply this survey instrument to assess whether motivational heuristics improve as a result of the proposed changes to the My Learning Assistant component of *Immune Attack*. If the enjoyment level of the game rises while simultaneously increasing the degree of interactivity with learning material during game play, the implications are positive for the amount of informal learning taking place.

III. Study Subjects and Data Collection

Study subjects will be freshman-level biology course students in two separate study groups. One group will be located at the University of Central Missouri, Warrensburg, MO. The second group will be located at the Missouri University of Science and Technology in Rolla, MO.

The study will focus on university students for two primary reasons. First, it is anticipated that the institutional review board approval process will be faster if adult students are used as study participants. Time is a constraining factor in this study, as it must be completed within the next ten weeks (by May 6, 2009). Second, the majority of previous *Immune Attack* user studies have focused on middle school and high school students. First year college biology students have been identified as a primary market for *Immune Attack,* but sufficient testing of this age level has not taken place.

All study participants will be provided with an Informed Consent to Participate form and participation will be fully voluntary. All data will be confidential in nature, and personal identification information will not be collected, retained or distributed. The study may not be fully anonymous, however. If a pre and post test method is employed (see next section), the investigators would like to correlate the two survey results submitted by each individual participant. This can be achieved confidentially by assigning random identification numbers to study participants.

IV. Research Procedures

The principal investigators in this study are currently considering two possible approaches to the research:

1. For both study groups, the survey instrument will be applied as a pre and post test. Study participants will be asked to first evaluate the current release of the game, and then evaluate a prototype version that incorporates the proposed game improvements. Due to time and cost limitations, the prototype will probably be paper-based.

2. One group will serve as a control group and the other as a treatment group. The control group will play the current v 1.0 release of the game and evaluate it via the survey instrument. The treatment group will play the paper prototype revised version of the game and evaluate it using the same survey instrument.

V. References

Ang, C. S., and Zaphiris, P. (2006). Developing enjoyable second language learning software tools: a computer game paradigm. In P. Zaphiris and G. Zacharia (Eds.), *User-centered computer aided language learning* (pp. 1-21). Hershey, PA: Information Science Pub.

Ang, S. A., and Rao, G.S. (2008). Computer game theories for designing motivating educational software: a survey study. *International Journal on E-Learning, 7*(2), 181-199.