Redesign: Using Educator and Student Feedback to Enhance Functionality and UI

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Abstract: As the primary development phase of *Touching Triton* was finishing, a multipronged approach to evaluation was begun. Through evaluation of student learning, student opinion, and teacher surveys and interviews, a number of changes to the UI were needed to make the experience more engaging for the students and more functional for the educators. Four areas of change were needed and made. Dissemination of *Touching Triton* is now underway as a more engaging and useful serious game.

Overview of *Touching Triton*

Touching Triton is an online serious game designed to teach players about common complex disease risk and risk estimation. In the game, players take on the role of a member of the human resources team at the fictional Chiron Avionics. Chiron Avionics will be launching a long-term space flight mission that will carry six crewmembers to the moon of Neptune, Triton. The player's objective for the game is to analyze medical record, family history, and genomic data for one of the crewmembers to determine that person's risk for six common complex diseases (diabetes, heart disease, colon cancer, Parkinson's disease, age-related macular degeneration, and venous thrombosis). Once disease risk has been analyzed and determined, students are faced with the task of managing packing decisions for the crew to prevent and treat onset of these diseases. Because common complex disease risk is neither 100% nor 0%, packing items will modify risk but not eliminate it completely. This adds a level of uncertainty within the algorithm used to determine outcomes of the game. Once packed, players launch the Argos1 (the ship that will carry them to Triton) and follow the journey as crewmembers travel to Triton and return home.

Before development of the game began, four foundational learning concepts were established for *Touching Triton*: 1) Many genetic and environmental factors interact together in a complex manner to influence health and disease risk; 2) genomic data can be used to determine a quantitative disease risk for an individual; 3) current knowledge about genomics and risk factors for disease is ever changing; and 4) personalized disease risk can inform decisions regarding lifestyle and medical interventions.

Evaluation Methodology and Results

An external evaluation group was contracted to assess the effectiveness of *Touching Triton* to deliver content as well as collect data on student engagement and educator opinions. A multifaceted, quasi-experimental case-controlled study design was implemented that included pre and post student surveys on gaming habits and content assessment questions, educator interviews, in-classroom observations, and educator post surveys.

Because evaluation and game finalization were concurrent, some evaluation data was used to modify gameplay. Specifically, four large changes have been made based on direct feedback from students and teachers. During in-classroom observations, evaluators noticed that the majority of educators told students that as they played the game, they would be taking on the role of one of the crewmembers that was traveling to Triton. Since the students were set up with the wrong expectation, the ending of the game was a significant disappointment to many students. In order to rectify the miscommunication, an introduction video was crafted that clearly states the role of the player and sets up the interactions and expectations. Based on additional feedback from students about the graphics and interaction at the end of the game, the decision was made to redesign this experience. The game concludes with the launch of the crewmembers aboard the craft that will take them to Triton and back. Originally, this was designed to reflect a schematic that one might see when watching a monitor at mission control (see Figure 1A). The redesign incorporated a much more graphically pleasing format, video flybys of each waypoint along the trip, and interactive health cards for each character changing a completely passive and nearly static conclusion to the game into a visually appealing and interactive experience for the player (see Figure 1B-D).

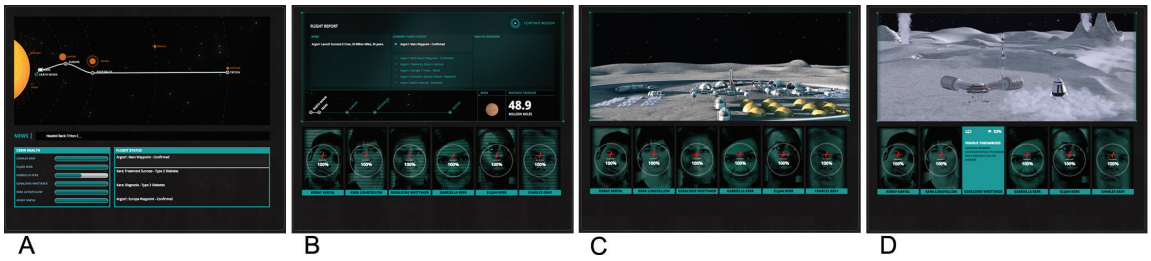

Figure 1: Comparison of early launch UI (A) to redesigned launch UI with videos (B,C,D)

Teacher feedback from early adopters prompted a change to the educator portal of *Touching Triton* where those with teacher accounts can create classes, missions, and track student progress. Tracking student progress in real time has been a feature of the educator portal from the beginning. The interface for doing so was very schematic in nature and not able to generate student reports easily. The redesign of this section includes updated visuals as well as the ability to generate PDF reports that can be emailed or printed. In addition to an updated educator portal, teachers also requested more background material on the content covered in *Touching Triton*. Instead of creating a physical manual for the game, a separate web portal was created called HG Helix (hghelix.hudsonalpha.org). When complete, HG Helix will work seamlessly with *Touching Triton* with teacher, student, and public facing versions of the site. Logged in educators will have access to teacher specific content: deepening articles, additional education resources, and online tutorials.

Dissemination Plan

Dissemination of *Touching Triton* requires educators to be trained in a meaningful way on the implementation of the serious game. Educator training is being done around the state of Alabama, drawing teachers from the surrounding states of Mississippi, Florida, Louisiana, Georgia, and Tennessee. During these daylong training sessions, information is being gathered so that an entirely online training module can be created with the intent of being able to train any teacher anywhere. In addition to training sessions in Alabama, *Touching Triton* training has taken place at the Georgia Science Teachers Association conference and is currently being planned for the National Association of Biology Teachers conference (Providence, RI) and the National Science Teachers Association conference (Nashville, TN). Additional presentations are being planned for the Games+Learning+Society conference (see Figure 2). It is currently estimated that the full online tutorial will be available online by the autumn of 2016, making *Touching Triton* accessible to educators worldwide

Figure 2: Currently scheduled training and presentation locations throughout the U.S.