Reports & communications

Debriefings of Web-based malaria games

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This study describes the postgame debriefings of an adolescent participant in the Philippines who had played two Web-based computer games related to the topic of malaria. These games, produced by the Nobel Foundation, the MOSQUITO GAME and the PARASITE GAME, were based on the works of Nobel Prize winners Ronald Ross and Alphonse Laveron. After the play of the games, a 7-point debriefing was conducted. This took place in an informal setting. The participant enjoyed and learned new content from both games. Also, the participant made suggestions about revisions of the games' objectives. The study revealed that the debriefing format was smoothly accomplished and effective for these games.

KEYWORDS: *debriefing; malaria; mosquito; Nobel Prize; Web-based games*

Malaria, a mosquito-borne disease, is one of the greatest world health problems, affecting more than a half billion people per year (Snow, Guerra, Noor, Myint, & Hay, 2005). In particular, children are afflicted with malaria (Roll Back Malaria, n.d.). Health education has been an integral component to malaria control both in schools and communities (Akogan, 1992; Cropley, 2004; Okabayashi, Thongthien, Singhasvanon, Waikagul, Looareesuwan, Jimba, et al., 2006). Also, educational board games were used to integrate health education directed toward mosquito-borne diseases such as dengue (Lennon & Coombs, 2005; Vivas & Guevara de Sequeda, 2003), as well as malaria (Akogan, 1992).

The Nobel Foundation (2005b) created a series of Web-based games based on works or discoveries of Nobel Prize winners across all prize categories, which among the category of medicine or physiology included two games on the topic of malaria (Nobel Foundation, 2005a). The two games concerning malaria (Nobel Foundation, 2005a) were the MOSQUITO GAME and the PARASITE GAME. The MOSQUITO GAME was based on the work of Nobel Prize winner Ronald Ross, whereas the PARASITE GAME was based on the work of Nobel Prize winner Alphonse Laveran (Nobel Foundation, 2005a).

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Crookall (1992) stressed the preeminent value of debriefing in the gaming process. Crookall further expressed the opinion about debriefing in gaming that "it tends to be the most neglected" (p. 141). Likewise, the PARASITE GAME and the MOSQUITO GAME of the Nobel Foundation (2005a) lacked structured debriefing components.

As a consequence, the purpose of this study was to explore the use of debriefing in a participant living in a mosquito-borne disease endemic area after the play of two electronic games on malaria. The debriefings were designed to illicit the participant's views about the game, learning about malaria, and potential changes to improve the game.

Materials and method

Design

This study employed a descriptive case-study method through postexperience debriefing after the play of two electronic games.

Participant

The study centered on a Filipino American aged 13 years, 10 months, who lived the majority of his life in a dengue-endemic Philippine city. Indigenous malaria cases have not been present in the participant's city. However, malaria, also a mosquito-borne disease like dengue, is present on the island on which the participant resides. The participant had previous experience in the creation of dengue-related mosquito control games (Lennon & Coombs, 2002, 2006). The participant had no previous experience in playing a game based on the topic of malaria. The participant has, however, played a variety of electronic games in the formats of PlayStation™, Game Boy Advance™, and CD-ROM computer games. Prior to this study, the participant had not played an Internet game. Active parental consent as well as participant assent was obtained prior to the study's start. The researcher provided an Internet card at no expense to the participant.

Games

At the Nobel Foundation's Web site, two games on the topic of malaria were accessed, the MOSQUITO GAME and the PARASITE GAME. Prior to the play of each game, a brief discussion of the health problem, how to play the game, and content questions was given to enable the participants to play. The MOSQUITO GAME gave two questions, and the PARASITE GAME gave one question. Once the questions were answered correctly, the player proceeded to actual game play (Nobel Foundation, 2005a).

MOSQUITO GAME. The play objective of the MOSQUITO GAME was to maneuver an Anopheles-malaria-transmitting mosquito through various environmental obstacles in order to suck blood from a human. A high score was achieved by

fast movement to reach human blood to suck and maneuvering the mosquito to avoid being killed. Obstacles included a bat, bird, fly swatter, spray repellent, and screen/mosquito netting (Nobel Foundation, 2005a).

PARASITE GAME. The play objective of the PARASITE GAME was to guide the malaria parasite to the human liver. From there, the player must guide the malaria parasite into a red blood cell, where multiplication occurred. A high score was achieved by avoiding barriers inside the human blood stream on the way to the red blood cell. Barriers for the malaria parasite to avoid destruction were cytotoxic T-cells, natural killer cells, antibiotics, and macrophages (Nobel Foundation, 2005a).

Debriefing

The debriefing followed the pattern used in a dengue game study (Lennon & Coombs, 2005), a version of Thiagarajan's (1992) 7-point debriefing. The researcher adapted the 7-point debriefing for games related to malaria. The researcher was permitted to probe responses for clarity. See the Appendix for the debriefing questionnaire.

Procedures

The researcher obtained parental consent and the participant's assent prior to the beginning of the play of the games. The study was also approved by the dean's office of the College of Education of Foundation University. The play of the games and their respective debriefings were accomplished in a home setting. The researcher provided an Internet card for Web connection at no expense to the participant. The participant first played the MOSQUITO GAME, followed by the PARASITE GAME. After the play of the games, there was a debriefing of the MOSQUITO GAME, followed by a debriefing of the PARASITE GAME. After the seventh debriefing question, the researcher restated the purpose of each game. The debriefings were conducted orally. The researcher wrote notes following each question's response. The oral debriefing was accomplished in this fashion to promote a more informal atmosphere.

Findings: Details of responses

MOSQUITO GAME

1. As a review in your own words, what was the game activity all about?
   "How mosquitoes die. They die easily."
   "Also, it's about how to survive from the 'monsters.'" (The "monsters" were in reference to those creatures or situations that attacked the mosquitoes.)
   "It seems they [the game designers] are trying to help the mosquitoes."
2. How did you feel after the game?
   "I felt good, because, the mosquitoes were eaten easily."

3. Did you like the game? Why or why not?
   "I liked the game."
   The reason why—"You get to fly around."
4. Did the game cover anything about the mosquitoes that is important to you? If so, please explain.
   "Yes, there are many things that can kill mosquitoes."
5. Did you learn some new things about mosquitoes? If so, what are they?
   "Yes, that bats eat mosquitoes."
6. Are there some things you would like to do to better prevent mosquitoes?
   "Not sure. Do the traps get rid of mosquitoes?"
7. Is there anything you can suggest to make the game better?
   "Be the person who stops the mosquito instead of being the mosquito."
   He went on to further state, "I thought we should try to prevent the spread of mosquitoes, not to protect them."

PARASITE GAME

1. As a review in your own words, what was the game activity all about?
   "It was about malaria."
2. How did you feel after the game?
   "I felt tired."
3. Did you like the game? Why or why not?
   "I liked the game."
   "The parasite game is nice because you can swim around. But, there are many obstacles."
4. Did the game cover something about malaria parasites that is important to you? If so, please explain.
   "Yes, it showed how the parasite goes into the body."
5. Did you learn some new things about the malaria parasite?
   "Yes, that it goes to the liver."
6. Are there some things you would like to do better to prevent malaria?
   "Not sure."
7. Is there anything you can suggest to make the game better?
   "Yes, you could be the antibody chasing the parasite."

Discussion

MOSQUITO GAME

From the perspective of the participant, the objective of the MOSQUITO GAME should be reversed. That is, the player should attempt to kill the mosquito rather than assist the mosquito. The original game objective seemed contradictory to personal as well as community needs for those living in malaria or other mosquito-borne disease zones. It developed a concept of assisting the mosquito rather than its eradication.

The game had a singular play objective to guide the mosquito to a person to bite. The game was fast moving, resulting in a small amount of time for the absorption of concepts. As a consequence, the focus was more on tactual or physical play, with a

limited amount of related learning activities. There were no secondary or advanced levels in the game. This further limited the educational potential of the game.

Some learning of practical value occurred. For example, the participant learned that bats were mosquito eaters. A fruit bat species is present in the participant's neighborhood. The play of the game had the residual effect of increasing a positive attitude toward bats.

The participant also expressed the notion that the player "becomes the mosquito" not just the guide of the mosquito. This exemplified a suspension of reality for the participant to play the game. However, this perception may have strengthened the participant's view that the game objective of aiding the mosquito to bite a person should be changed.

The first stage of the mosquito life cycle, the depositing of eggs, was presented in a pregame cartoon video. However, it was not demonstrated again during the game. This most likely was not repeated because the game's focus was on the adult mosquito. However, a critical concept to inculcate into the minds of people living in the malaria zones is not only protection of susceptible individuals from adult mosquito bites but also elimination of mosquito breeding sites.

PARASITE GAME

The participant found the PARASITE GAME easy to play. The participant received two game scores listed in the top five of those who had played the game. This was in spite of the point that the participant was younger than the suggested minimum age for play of the game.

The participant reported learning about the malaria parasite entering the human liver. However, the health consequence of the malaria parasite entering the liver (disease severity) was not clearly made during the game's play.

The game presented various components of the human immune system. Each immune system component could stop the malaria parasite during the play of the game. But, the immune system's specific components were not connected to the learning aspects of the game. As a consequence, the different aspects or roles of the immune system could not be reinforced during the game's play.

The play of the PARASITE GAME was completed by the participant very quickly. As with the MOSQUITO GAME, this quick play of the game limited the opportunity of absorption of learning. Also, the game lacked any information about prevention of the disease.

The participant also expressed the opinion that the play objective should be reversed. Rather than aiding the parasite or being the parasite, the player should be one of the immune system defenders against the malaria parasite. In this case, the participant did not specifically indicate that the player "becomes the parasite." However, it is clear that the participant stated that the player should become the immune system defender, such as an antibody.

General thoughts

The participant's background in creating dengue (mosquito-related) games as well as residence in the dengue zone (a mosquito-carrying disease endemic in the area, similar to malaria) may have caused the participant to stress that the player in the MOSQUITO GAME should fight against the mosquito instead of trying to help the mosquito. The participant reiterated that point at the end of the debriefing session. Likewise, the participant indicated that the player in the PARASITE GAME should defend against the parasite instead of aiding it.

It is surprising that the simplicity of the graphics of the games was not a factor in whether or not the participant enjoyed playing the games. That is a valuable concept. It appeared that the activity of play of each game and the ability to perform well (in the case of the PARASITE GAME) had more importance for the participant in desiring to play the game as opposed to sophisticated graphics.

Content checks were not done during each of the game's play. The learning objective of each game appeared to be synchronized with each game's play. This appears to correspond to the flow theory, where a favorable experience in electronic gaming is achieved through uninterrupted flow (Habgood, Ainsworth, & Benford, 2005).

The games were designed for a player without previous knowledge of the topic of malaria. The knowledge taken was always minimal. Therefore, there ought to be clear linkage of the games to other learning activities, especially for those playing the game at home or in a nonschool context. However, these games may provide wonderful adjunct learning activities connected to the school curriculum.

Debriefing is an invaluable component of the gaming process. This study demonstrated the utility of debriefing in the MOSQUITO GAME and the PARASITE GAME. It is recommended that these games include a debriefing component for future players. Perhaps, a guided self-debriefing may be included at the end of the game. Malaria-related games and the other Nobel Foundation games may enhance their educational value with the inclusion of debriefing components.

Appendix
Malaria Games Debriefing Questionnaire

Please give an answer in your own words to the following questions:

1. As a review, in your own words, what was the game activity all about?
2. How did you feel after the game?
3. Did you like the game? Why or why not?
4. Did the game cover anything about mosquitoes/the malaria parasite that is important to you? If so, please explain.
5. Did you learn some new things about mosquitoes/the malaria parasites? If so, what are they?
6. Are there some things you would now like to do to better prevent malaria?
7. Is there anything you can suggest to make the game better?

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