Evaluation of a Type 1 Diabetes Game Board Prototype

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Introduction

Type 1 diabetes is a chronic disease in which blood glucose levels must be continually monitored due to changes in diet, exercise, stress and insulin doses. Blood sugar regulation may also be a challenging topic for undergraduate students in health-related programs to grasp. The ultimate goal of this project is to produce an online educational board game which will allow students to gain a better understanding of diabetes and its management. Winter-2015 UROP student, Francesca Seal, developed a game board prototype which was tested by students in health-related fields as part of this year's project. Focus groups were conducted, of which data from pre- and post quizzes were statistically evaluated to determine if gamification of this topic resulted in a change in understanding of blood glucose regulation. Feedback surveys were used to collect relevant information for future improvements. Findings from this research will be used to enhance game elements and promote interactive learning in students by giving them the chance to assume the identity of a person with type 1 diabetes and encounter real-life diabetes-associated challenges.

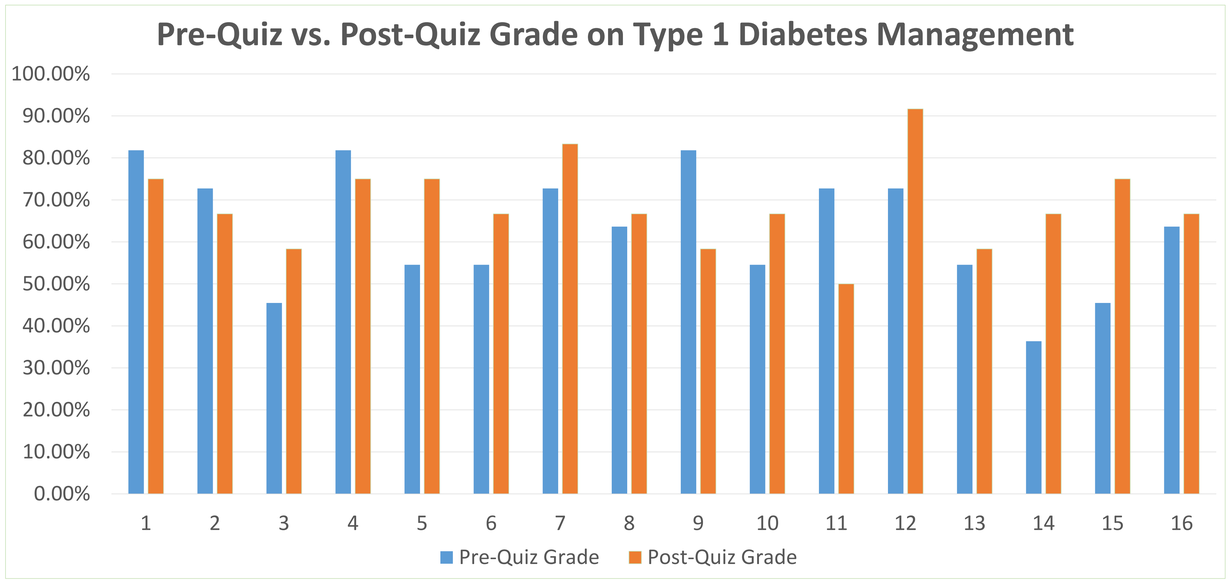


Figure 1. Comparison of pre-quiz and post-quiz grades on type 1 diabetes management in a sample of 16 students. Test scores showed improvement at the 95% confidence interval through analysis of paired t-tests. Many students completed the pre-quiz with prior knowledge of diabetes and had consistent results in the post-quiz.

Conclusion

This project focused on gamification, a concept which incorporates game elements to promote engagement, learning and retention. It does this by giving players low-stakes opportunities to sometimes fail, learn from mistakes and be successful. In conjunction with a complex topic such as Type 1 diabetes, this may be a valuable educational tool for students in health-related fields to improve learning. Overall students had a great experience playing the game. In the feedback surveys most students indicated that they enjoyed the game and found it to be fairly easy to very easy and the time required to learn how to play and complete the game was acceptable. One of the major goals in improving student's understanding of diabetes and its management was achieved, as showed in the statistical analysis of pre- and post- quiz results. Most students had prior knowledge of diabetes from class instruction or possibly family members and friends, which may have resulted in similar results between quizzes. The surveys were essential in evaluating the strengths and weaknesses to be modified in order to ensure a smooth online conversion of the game board prototype.

	Too much	About right	Too little
The amount of time I spent learning how to play the game was:	19%	81%	0%
The amount of information on the feedback cards was:	31%	69%	0 %
The amount of time required to complete the game was:	38%	56%	6%
The amount of reading I had to do for this game was:	31%	63%	6%

Figure 2. Student were asked to provide feedback concerning content and time required for completion of certain aspects. The majority of students chose the description "about right".

	Yes	No
This game helped me to understand the daily challenges of managing diabetes.	100%	0%
I liked the idea of my game character being someone with diabetes.	94%	6%
I wanted my game character to make good choices and earn rewards.	100%	0%
I would enjoy playing this game again.	94%	6%

Figure 4. Students were asked to express their opinions regarding their experience during the game. Results from the survey showed positive attitudes post-gameplay.

Methodology

- Focus groups were conducted from a sample of students without diabetes (n=16), majority aged 19-20 in health-related fields including nursing, health sciences and biomedical science.
- Pre-quizzes completed prior to gameplay to establish baseline knowledge
- 3-5 students were assigned to each game board and given one hour to play and test the board game
- Materials used included: hard copy game boards, food cards, meal cards, outline- instructions and information
- Post-quizzes completed after game play to determine if playing resulted in a change in his/her understanding of diabetes management
- Data collected from pre- and post-quizzes were paired for statistical evaluation and paired t-tests were performed on the data
- Surveys composed primarily of Likert-based questions were completed to provide useful feedback to revise the game and ensure sufficient game components concerning game flow, suitability and educational value

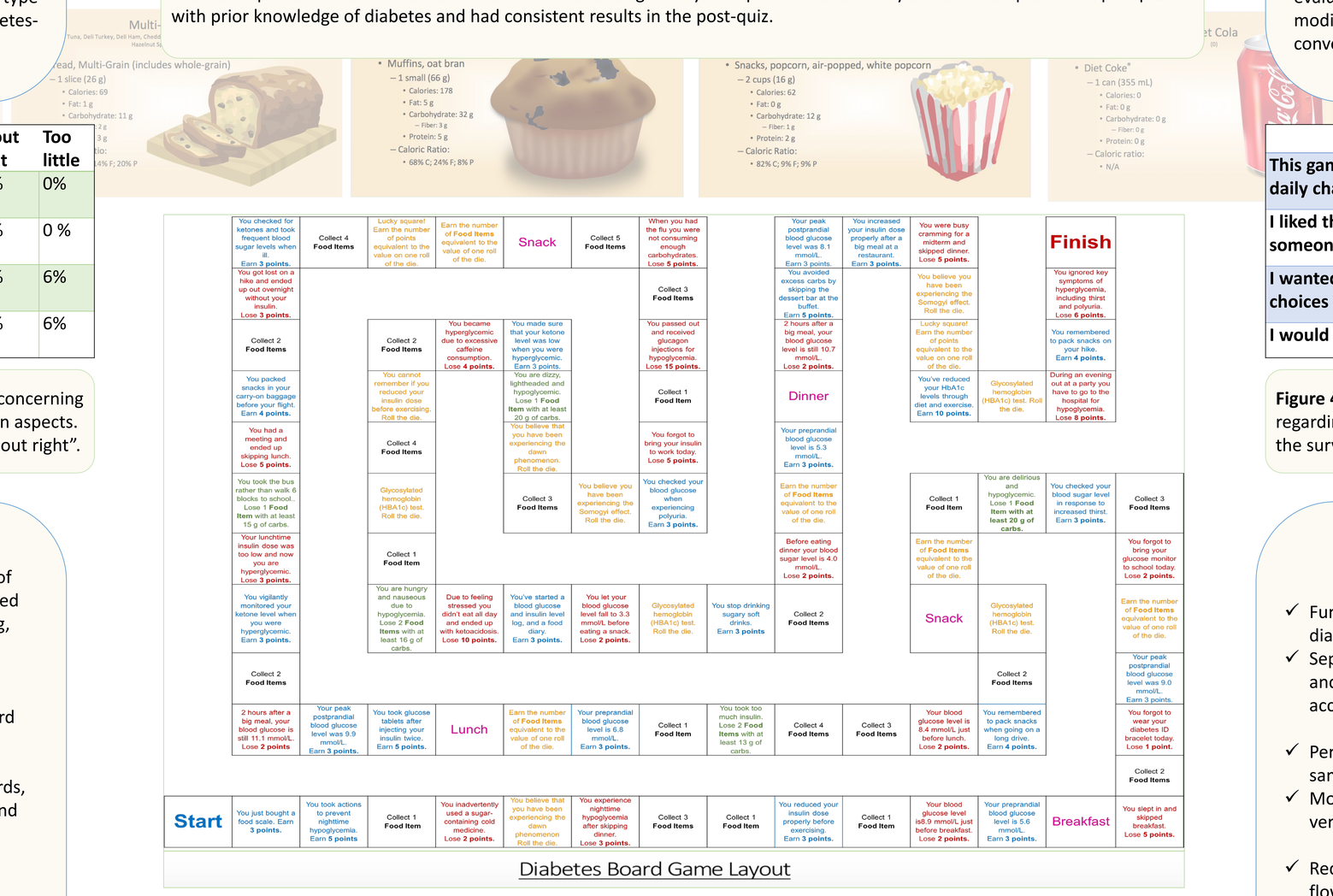
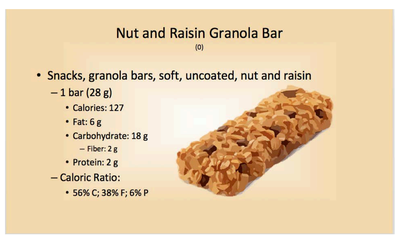
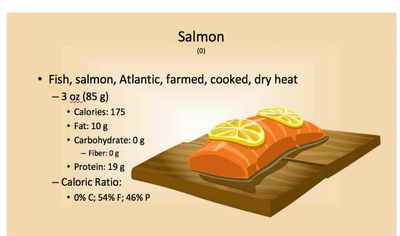
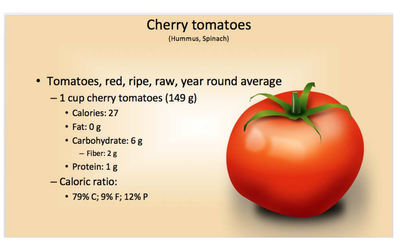


Figure 3. Type 1 diabetes game board prototype developed by past UROP student Francesca Seal during Winter 2015







Future directions

- ✓ Further development and evaluation of a Type 2 diabetes game board
- ✓ Separating the outline into an instruction booklet and an information booklet to increase accessibility
  - ➢ Possible instruction video/audio clip
- ✓ Performing additional focus groups to increase sample size and obtain more accurate results
- ✓ More prominent information cards in online version to increase educational value
  - ➢ Create pop-up info cards
- ✓ Redesign food and meal cards to improve game flow
  - ➢ Colour coding, labels, emphasize carb number
- ✓ Eliminate carb counting issue in online version to improve game flow
- ✓ Correct missing elements:
  - ➢ Buffer zone, number of dice, different types of "loss" and "reward" spaces

References:

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