

SWISS FOODQUIZ: INDUCING NUTRITIONAL KNOWLEDGE VIA A VISUAL LEARNING BASED SERIOUS GAME

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1 Motivation

Obesity is a growing disease and nowadays affects more than 600 million adults and 42 million children [2]. Education Programs have been proposed, as nutritional knowledge plays a pivotal role in behavioral change towards healthier diets [3]. However, due to limited financial resources, the majority of population cannot be included in current personnel-intensive nutritional education programs, which additionally face the challenge of low acceptance rates [4].

Health Information Systems (HIS) have potential to spread nutritional knowledge towards broader audiences at significantly reduced costs over the internet [5]. Still, also contemporary nutritional HIS experience low engagement rates, especially in demographic segments that are predestined for obesity, mainly due to low self-motivation and involvement [6]. Furthermore, the applicability of gained, abstract nutritional knowledge is in many cases not directly applicable to everyday purchase decisions [7].

2 Prototype Design

The design of Swiss FoodQuiz extends current nutritional HIS concepts by applying 1) gamification elements [8] which are known from successful serious game HIS [9] and 2) visual learning [9] through the integration of product images:

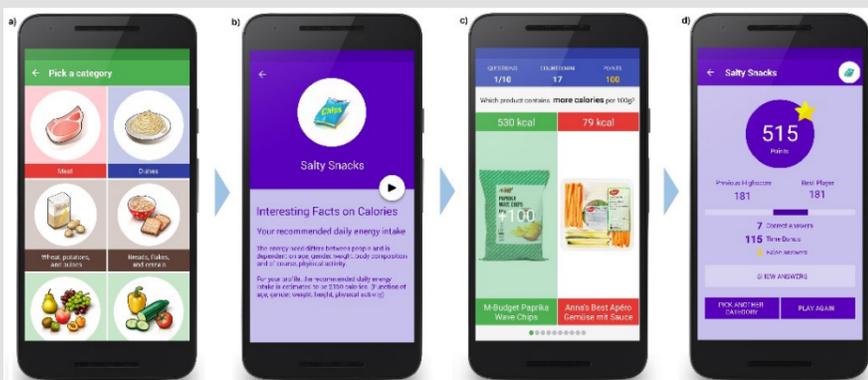


Figure 1. A game round consists of a) selecting category, b) receiving relevant nutritional education about upcoming category, c) answering ten visual examination tasks with instant feedback after each answer, d) receiving a score feedback

The prototype aims to raise HIS acceptance by leveraging gamification elements which increase user motivation [10] and to improve applicability by integrating packaging images of food products from the largest curated national product database, as visual learning promises superiority over contemporary education concepts [11], usually taught via reading or aural learning of abstract recommendations [3].

3 Preliminary Study

The application was released in Swiss Google Android Play Store and has recruited 475 downloads within a two-months preliminary testing period from Nov. 27th 2015 to Jan. 27th 2016. In total, 350 users (74%) completed the mandatory, introductory survey and were admitted for usage of the prototype. The prototype captures user performance (% of correct answers) for each quiz round of ten visual examination tasks over time.

Hypothesis: By receiving nutritional information in the game, users eventually gain knowledge about products and nutrients, which is applied when answering future questions within the same category, thereby leading to higher task performances over time, measured by the percentage of correct questions per round.

4 Preliminary Results

The preliminary results show the prototype successfully is able to recruit adult, uninvolved users. Furthermore, the BMI distribution is representative for the Swiss BMI distribution.

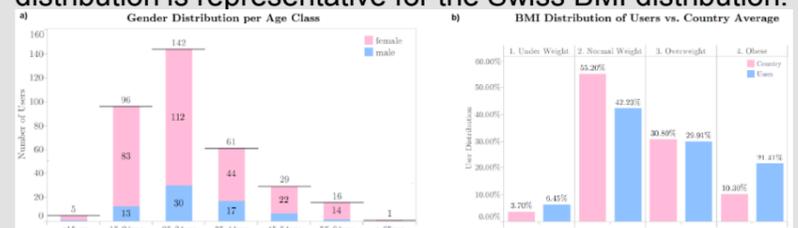


Figure 2. a) The prototype has high acceptance among adolescents and adults. The user base is an adequate sample of national population in terms of b) BMI distribution.

Further, the HIS prototype is able to attract uninvolved users, with little awareness for (nutritional) health:

Question Group	Question	Answer	User Group
1 Physical Activity	1 In leisure time	Very active (at least 5h per week)	9.30%
		Average (2h to 5h per week)	33.34%
		Rather inactive (less than 2h per week)	52.46%
		Very inactive (e.g. housewife)	13.98%
2 Self Evaluation	1 How would you rate your nutritional knowledge?	Average (e.g. policeman)	43.54%
		Rather inactive (e.g. office job)	43.68%
		Very good	12.68%
		Good	33.52%
2	2 How important is the nutrient content of a product in your purchasing decision (in comparison with e.g. price or taste)?	Average	43.94%
		Poor	7.32%
		Very poor	2.34%
		Very important	18.76%
		Important	32.58%
		Neutral	27.38%
		Not so important	13.31%
		Unimportant	5.67%

Figure 3. Introductory survey results show that the majority of users (prior to HIS usage) is physically rather inactive, without nutritional preknowledge, nutritionally unaware in their purchasing decisions, and therefore ideal users of HIS

Furthermore over the HIS usage period, participants gain significant nutritional knowledge, as the learning curve of the preliminary study users proves:

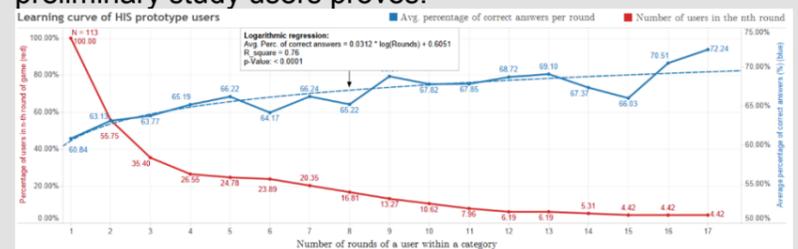


Figure 4. Performance of users increases over time, indicating a learning curve. In parallel, user retention wears off over time. A first logarithmic regression yields significance regarding the improvement of task performance over time (R2 = 0.76).

5 Conclusion

This study exemplifies a new, scalable approach towards high acceptance and interaction rates within broader, adult audiences, esp. including the physically inactive and uninvolved users that were previously unlikely to accept nutritional HIS. Further, the HIS offers high applicability of quantifiable knowledge gains due to integration of images representing locally available, real-world products.

6 References

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