Mobile gaming in gyms - can fitness and games join together?

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***Abstract*— Combining gym exercising and mobile gaming is bringing together two global trends. In this research, it has been studied how a gym-themed mobile game can be connected to a real gym setting by bringing personal exercising data from wearable sensors and gym equipment to the game. It is also studied how the gym goers see the gaming when combined to their exercising routines.**

Keywords—mobile gaming, exercising, exergaming

I. INTRODUCTION

Mobile gaming and fitness have been two major trends in recent years and there has been efforts to combine these trends together. In 2016, mobile game industry brings in revenue of $36.9 billion yearly, and can be expected to grow to $47.4 billion by 2018 [1]. CrossFit or other modern fitness competitions have brought competitive elements for working out and offer motivation for goal-directed gym goers. Exercising and dieting applications like Endomondo [2] or MyFitnessPal [3] have been bridging digital and real world for more than a decade now. In the exercising applications, the data from the workout is recorded and visualized for easy access for the user. That data can be used to optimize the workout or just to create interesting and meaningful statistics.

From the gaming point of view, the connection of exercising and gaming has been quieter. There are exergaming (portmanteau of gaming and exercising) concepts which usually are expensive and big devices targeted to be installed to gyms and make the exercising itself more enjoyable and increase motivation. Mobile games where exercising is an important part of the concept are available, but not that common. One of the best example of combination of mobile gaming and exercising is Pokémon Go where walking and exploring in real world is part of the core concept of the game, but in the Pokémon Go the focus is not in the walking but collecting the pokemons.

The goal for this research is to find if and how exercising in a gym setting can be connected to a mobile game and how the gym goers see the connection in their daily life. The research is done in a project which aims to combine fitness and gaming in global scale. Project partners include a mobile gaming startup, which has the global aspirations and an upcoming gym company, which builds a new gym to Helsinki, Finland and it is the first of its franchise. The Concept is more thoroughly explained in Section II.

The used research method is two-part. Firstly as a case study the concept is studied and researched how the connection between gym and the game is done in conceptual level. In addition there has been a study via field test where gym goers have been playing the game and their opinions and views have been collected via two questionnaires.

This paper is organized as follows: in Section II related research about exergaming and how digital applications have been affecting the motivation to exercise. In Section III there is explained the concept of the game and the gym and how they are connected. In fourth section the setting for the Field Test is explained and results are shown. In Section V there is discussion about the results and the concept and in the last Section we conclude.

II. RELATED RESEARCH

A. Gamification of exercising and health

There are earlier research regarding fitness applications and different aspects of gamification. However, there is a lack of research focusing on connections between the gym training and mobile gaming.

Gamification and as a subset exergaming has been a studied topic in recent years and there has been both industrial and academic approach to it. Deterding et al. [6] define gamification as universal term where elements gaming elements are brought into non-gaming systems to improve user engagement and user experience. Schöbel at al. [7] argue that

there is no one-size-fits-all approach for gamification and lots of gamification projects have failed because of this.

Lister et al. [8] have been studying how much gamification features have been added to health and fitness mobile apps. To clarify these were not games but applications to measure physical activity or diet. The number of health apps are staggering. In 2014 there were already over 31000 health, fitness or medical apps on the market [9]. As a result of Lister et al.'s study 52,5% of studied apps had at least a one gamification element the social/peer pressure element being the most common one. Wu et al. found that leaderboards in a fitness app and social pressure increase average physical activity. Competitiveness may have negative effects too and it does not work for all people. Reeve and Deci [10] have found that competition may demotivate people and Locander et al. have found that people who are reluctant to social comparison do not look at others to compare their own behavior [11]

One of the most focused concepts the innovative exergaming companies have been adding monitors to an gym equipment and show there changing scenery as the user cycles the bike like for example Motion Fitness [12], Zwift [13], Spivi Studio [14] or Trixter by Athene Gaming [15]. Another major exergaming concept is to focus on games and include gaming elements where running, rowing or cycling will take the avatar forward in the game and there are mechanism to steer it towards hotspots like in BlueGoji [16]

B. Mobile gaming

Exergames based on GPS has been studied by Boulos and Yang in 2013 [17]. Location-based games are based on existing areas and streets in the real world outdoors. When a player arrives to a GPS coordinate he or she can interact with a hotspot there. Boulos and Yang find location-based games especially interesting for young people who do not enjoy traditional sports, but note that automatically generated hotspots may endanger the players as the game does not know in which kind of area the hotspot is really located and if it is forbidden to access or outright dangerous.

III. CONCEPT

A. The game

The mobile game and the gym are both stand-alone services and there is a possibility to use both services without the other. In fact, the linkage between the gym and the game might be unnoticeable if the user is not especially aware of the other service.

The mobile game is a free-to-play and in this stage only available in Finland for both iPhone and Android. The monetization for the game is now through in-game purchases where players may buy game currency to make their progress faster in the game. The mobile game can be described as a collection of small games, which the player may play a certain subset of them if desired.

The core game loop the game has is focused on a set of minigames themed around the gym domain - boxing, weightlifting and treadmill. Core game loop means that the player do the tricks and go through the certain hoops to end in the same place he or she left to begin with, but with more experience or resources. This motivates him or her to go through the game loop again. This makes the game tick.

These minigames can be played physically everywhere. Playing them consumes energy points, which are gained new every fifteen minutes. Energy points can be bought also with activity points gained in Go -feature or by bringing exercising data to the game. Players compete in these minigames to climb in daily ranking and earn the in-game currency. The selection of minigames (left) and selection of session boosters (right) are shown in Figure 1. The leftmost picture in Figure 2 is an image of a treadmill minigame. In addition to minigames there are minigame challenges, where player needs to perform better in each minigame gradually as the player progresses in the game. Results of the daily minigame are combined and showed in the daily competition where the player may see also other players' combined results. The competition is shown in Figure 3's the rightmost image.

Figure 1. A combination figure from the minigame feature. Left side is the selection of the minigame and right side is selection of boosters for the said session.

The mobile game has feature named as Go. The Go-feature, where the user may roam in the real world and explore it. The Go -feature is a location-based subgame, in which is played on a map where an avatar is walking around the map according the GPS coordinates the phone provides. The gameplay is familiar to very popular Pokémon Go -mobile game.

In Figure 2. the rightmost picture shows how the Go -feature looks like. The Go -feature also provides player daily challenges where the player is competing against other players how much they can walk during a certain period - for example 10 minutes. In addition, there are mystery boxes to find and

quests to carry out for the players when they are walking around. Players may earn soft currency and activity points in the feature, which in turn may be used to buy energy or boosters to the minigames. Sasson [4] describes soft currency to be more like a virtual currency and hard currency resembling more a real money for the players.

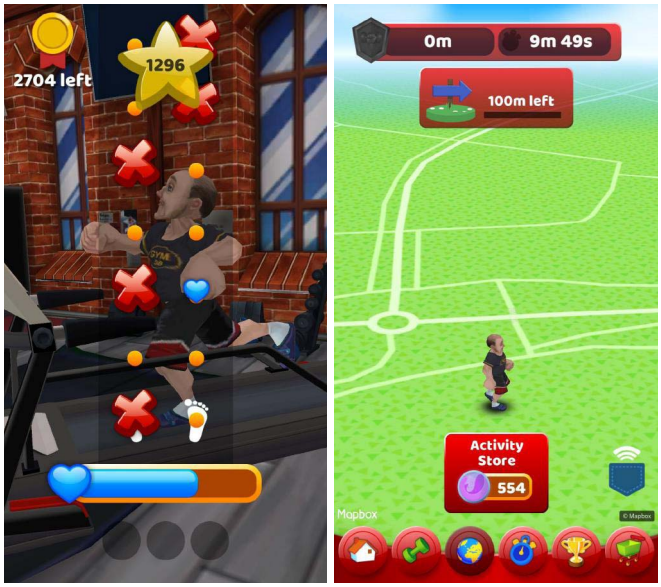

Figure 2. A combination figure of a treadmill minigame and Go -feature

The game has three distinctive currencies: coins, gems and activity points. Coins are the soft currency, which is earned easily by gaming, gems are the hard currency and have the most power and they can be bought from the store by using real money. Gems can be earned by playing the game, but they are rare. Activity points are earned by real exercising or by playing the Go -feature. One could argue that there are fourth currency: energy points, which are used when minigames are played. The energy points are recreated one per fifteen minutes and they max out at five, but player can buy more.

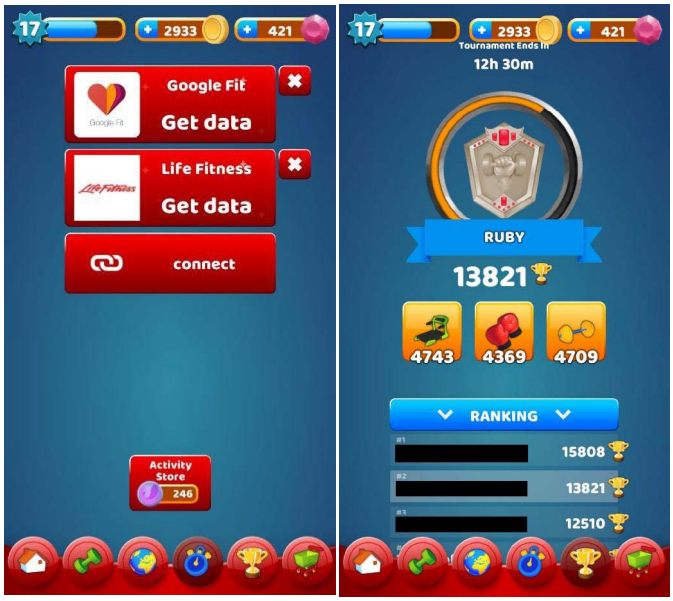

Figure 3. A combination figure of the exercise data connection feature of the game and the right side picture is from the competition part. The names of the players have been blacked out.

The game offers a variety of exercising data sources that can be connected to the game. The most important connection might be Life Fitness gym equipment [5], which connects the game to the gym, but the game uses also interfaces provided by Google Fit, Apple Health, Polar Flow and Fitbit to import exercising data and converting it to game currencies. In Figure 3 in the leftmost picture there is interface how to link different sensors, gym equipment and exercising data apps to the game.

B. The Gym

The gym is in Helsinki, Finland and it was founded in summer 2017 approximately at the same time the game was launched to public. The gym shares a brand with the game and the brand has some recognition in fitness scene in Finland as the brand was launched almost a year before in a fitness exhibition event in Finland.

As the gym is a new one, it has been in customer acquisition mode and thus focused on how to sell memberships to potential customers. The linkage to the game has been one of the selling points but not a major one. In the end the selection of gym equipment, the atmosphere and other things that make training more enjoyable are the things that customers are most after when buying the membership. The outcome of this is that the people with the gym membership are firstly trainers and not gamers and this makes an interesting dynamic how the game can be interesting enough to be played by the regulars.

C. Linkage between the game and the gym

The gym has cardio equipment made by Life Fitness and it has digital interfaces that can be accessed programmatically. This is the main linkage between the game and the gym and makes it possible to get meaningful information from training to the game. In addition to cardio equipment there are other gym equipment like free weights, which are not connected to the game. This may make some gym goers not interested in the game if they prefer to train with other equipment than cardio equipment. The ability to connect personal sensor wearables like Fitbit or Polar allow all exercising to be connected but in gym environment the heart rate based devices may not excel in all situations.

In the Go -feature there is also connection between game and the gym. The gym's coordinates are a hotspot in the game map and provides extra benefits for players who come near. The hotspot will work also for the players, who are not gym patrons.

IV. Field Test

A. Setting of the field study

The field test was conducted in a gym in Helsinki, Finland and it took about two weeks for each participant. The participants were recruited by the gym staff by approaching them directly on the gym and explaining what kind of field test is being made and what effort from them is needed. The recruited participants were regulars in the gym and all of the participants had an individual schedule for the field test meaning that people started the field test at different times.

The field study was small where out of six recruited people four answered to both questionnaires. When analyzing the results this has to be taken into account. Another limitation is the possible bias of the recruited participants. The gym staff had no predetermined selection criteria for the participants but after some discussions with their clients, they ended up with six persons who were interested.

The field test was two-phased in which both the participants filled a questionnaire to report their activities regarding the use of gym and the game. Before starting the field test the participants were informed about the practicalities and explained the privacy policies of the test and they were given the download links for Android and iPhone versions of the game. The questionnaires were in Finnish and were responsive in design that the participants could use their computers, tablets or phones to answer the questionnaires.

The first questionnaire ended the first phase and it was sent out 3 to 4 days after the start of the field test. The time was chosen to remind people to start to play the game and be able to get the first impressions of the game. The second phase lasted for one and half week to get people enough time to try the game and have time enough to visit the gym during their weekly routine.

The questionnaires were web-based and sent individually participants. Questionnaires were semi-open where most questions were multiple-choice questions with few open questions in the mix. In the first questionnaire, the participants were asked about their age, gender and their exercising activity level. The first impressions were asked too in the first questionnaire and inquired which features they already had tried during the 3-4 testing period and what were the interesting features for them. Also participants were inquired what personal exercising data they had connected to the game.

In the second questionnaire, the participant was asked how often they had played the game, how often they had exercised during the test period and how far they were in the game after the two weeks test. There was questions about the game and how they had played different features and how often the certain feature, like Go-feature, was played by the participant. The questionnaire inquired yet again if the participant was connected personal exercising data to the game and if they had bought anything with the activity currency they had earned. The participant were asked did the game get him or her to exercise more or in a different way or was it more fun to exercise as it meant something in the game as well. From the another perspective it was asked if their gaming time was increased because of their exercising. Also how meaningful the connection between personal exercising data and the game was to the gym goer was asked.

Finally the social side of gaming in the gym environment was studied and the participant was asked did he encounter other players and/or discussed about the game with other gym goers and what kind of feelings the gaming in gym raised.

The participants were all male and their age ranged from 18-24. Their exercising activity was high and they went to gym 3-4 times per week and one reported his routine to be 5 or more times per week.

B. Results of the field study

In the first impression questionnaire, the field study participants were all considering the game to be somewhat interesting before they started to play. The most tried features the were minigames and the Go-feature and most had connected their personal exercising data to the game. Nobody used FitBit or Polar Flow, but Google Fit, Apple Health and Life Fitness were used. The most interesting features according to the participants were though competing against other players and exporting the exercising data to the game.

The hardest feature to understand when the player was learning the game was furnishing the apartment and dressing the avatar and some participants regarded the Go-feature and competition against other players to be confusing when learning to play.

The second questionnaire covered the topic after the players played the game for almost two weeks. Their gaming frequency ranged from multiple times a day to "tried once", but most of the participants had been playing the game quite a lot. In fact one participant reported to be on level 13 and it takes a while to get there.

During the test period the participants tried the Go -feature at least few times each. The connection between the Go -feature and gym is not strong as it may be played everywhere, but the feature was interesting enough for all to try it few times

at least. The all participants found how the activity points from the Go -feature can be spent and bought something.

The minigames were played also during the test period and it was much more popular feature than the Go -feature as the participants played minigames multiple times per day or at least once a day. Compared to go-feature what the participant tried few times during the two week test period. For the gym goers the competition against other players were not that interesting and half of the participants said they did not look the results after playing. The game guides you automatically to the tournament results when the app is launched for the first time during the day In general, the participants were eager to play the game after the test period, the half had a clear yes as an answer, and half answered that they might try it.

From the perspective of the gym goers the game did not increase motivation to exercise more or in different way. Only one participant found the motivation to exercise increased and none found that their way of exercising would change due the game. What the game achieved was that half of the participants found the exercising be more fun as it mattered also in the game.

The gaming did not increase the exercising but the connection was in the other direction. The participants said that the exercising was increasing their gaming time. To summarize this the exercising was the same as always but as it mattered in the game the participants reaped the rewards of exercising and kept playing more. In general, a connection of exercising data to a game was sensible and meaningful for the participants.

The social aspect of gaming in gym setting was researched as well. None of the participants found that it would be embarrassing or otherwise looked down socially when the mobile game was played when rest of the gym goers might see it. Half of the participants had been discussing in the gym about the game and majority knew other players in the gym.

V. Discussion

Combining mobile games and gym exercising seems to be a good idea according the studied gym goers. The mobile game studied in this paper has not focused solely on the connection of gym and the game, but it has had a broader approach as potential players come from different background and the game needs to be able to be played by the non-gym audience as well. This is evident by the non-gym features like minigames which are gym-themed but can be played everywhere. This may be described as a game-first approach.

Exercising itself was not affected by the connection to the game and it may require different type of game or different target group to achieve this. The people in the gym are there because they want to exercise and the motivation to do that already exists. How the concept of combining gym and the gym would affect people who do not frequent in the gym and could the game motivate they to exercise more should be researched in the future.

Integrating the gym equipment data to the game has opened different possibilities when companies are designing new games or further develop the current one. The data has lots of meaning for the exerciser as it has been produced with lots of sweat and hard work. Using that data in gaming or other purposes makes the game or a digital service in general a meaningful for the user. For the future of course different type of gym equipment would be good to be available for integration and for the equipment like free weights could be measured some other way to produce data for this kind of endeavors.

The amount of test users in the field study was small and a test period was short, which limits the generalizability of the findings. Thus, in the future the field study should be conducted with a larger group people using a mobile game as a part of their daily life and exercising. A longer test period with bigger amount of users would enable to study deeper e.g. the commitment of gym-goers to use the mobile game as a part of their daily routines and motivational aspects regarding gaming and exercising.

VI. Conclusion

In the study the combination of a mobile game and a gym has been researched. The mobile game approached the concept in game-first approach and did not solely focus on the gym connection. The gym connection was made by integrating the equipment data from cardio devices to the game via available APIs and making gym location as a hotspot in location-based feature of the game. Gym goers participated to a field study where they played the game and answered to two questionnaires about how the saw the combination of gaming and the exercising in the gym. The exercising was not affected by the gaming and people exercised how they did previously, but their gaming time increased and people felt that the meaningful data from the exercising made them play more. Gym goers had already motivation to exercise and in future research the target group to study could be people who are interested in exercising in a gym, but do not yet have enough motivation to do so.

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