



Applying Social Gamification in a Gamified Point System

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Abstract. User engagement measures whether users find value in a product or service, which is highly correlated with overall profitability. If users choose to spend their time on a particular application or website, it means that they found value in it. This allows businesses to monetize products or services through advertising, subscriptions or sales. To increase user engagement, it is necessary to meet user needs to improve their experience. Recently, gamification has become increasingly popular because it applies game mechanics to non-gaming environment like education and shopping to attract and motivate participants. In this paper, we explore using social gamification in a gamified point system. In particular, we focus on two types of user interaction, namely competitive and non-competitive interaction. In preliminary experiments, we obtained positive results from the experimenters.

Keywords: Competitive and non-competitive interaction · Gamification · Social incentives · Motivation · User engagement

1 Introduction

User engagement is an assessment of an individual's response to a certain product (such as a product, service, or website), which is considered an important aspect of user experience [1]. An individual's degree of engagement may be determined directly through interaction or may be assessed through observation of the user's behaviors. A website user, for example, might click links, comment, download documents and watch videos, among other possibilities [2]. Highly engaged users are more likely to buy, return, and share the product or service with friends [3]. By improving engagement, the product's profitability can be improved. Therefore, user engagement is very important for commerce [9, 10].

Some factors are considered important components to increase user engagement. One factor is to find out what users consider valuable [3]. For news sites, users may find value in the process of being knowledgeable, elated or outraged. For social media applications, it might be a hit of dopamine upon feeling socially connected. It is important to identify these critical moments and consider product changes that provide more variation.

Offer and incentive programs are also a frequently used method [4]. To increase engagement and retention, users need to be motivated to use the application. An example is reward program of Starbucks. Starbucks offers one of the most sought-after loyalty programs ‘Starbucks Rewards’ program that offers freebies and discounts to members giving them plenty of reasons to choose Starbucks over other players [5].

Financial incentives may not be the only reason that engages people. Social media marketing is a common way to increase user engagement nowadays. Since the dawn of social media, brands have been trying interact with potential customers in a two-way conversation [6]. Companies want to engage and interact by personalizing their consumers’ online experience. Besides, previous research suggests that social incentives, such as a team weight-loss challenge and cash incentives based on group participation may keep participants engaged longer [7]. The peer pressure of being part of a team, desire to win in the competition, and encouragement from others are also motivating factors that can increase participation.

In summary, value, incentive program and social features are of great significance for user engagement.

A loyalty program is an example of user engagement designed to keep customers engaged to continue shopping or use the services associated with the program by providing financial rewards [8]. A very common type of loyalty program is the point system [11]. Customer purchases toward a certain amount of points to redeem the reward while retailers can collect personal data to profile the customers, maximizing the profitability of the promotional and pricing strategies [12].

Although they have proven to be valuable incentive programs, loyalty programs, including the point systems, need to be improved. According to The Loyalty Report 2017, customers belong to an average of 13.4 loyalty programs, but are active in only 6.7 programs [13]. Similarly, research finds that 54% of loyalty memberships are inactive with 28% of customers abandoning the loyalty programs without redeeming points [14]. One of the main reason is that these programs do not offer enough value to customers [15]. Offering customers 1% cash back on purchases, oftentimes does little to excite customers enough to change their buying behaviour and it was found the sweet spot when it comes to balancing business goals with high value rewards is around 5%. For preferred clients, 10% is often more than enough to motivate loyalty [15]. In addition, social feature is becoming increasingly important [16,17].

In our research, we explore social gamification, which uses social features and behaviors to amplify gamification effects, in a gamified point system to provide social connection between users [12]. Social connection is the experience of feeling close and connected to others [18]. It involves feeling loved, cared for, and valued, and forms the basis of interpersonal relationships. It is understood as a core human need, and the desire to connect as a fundamental drive [19] [20]. The purpose of the study is to explore whether social connections between users help promote user engagement. Specifically, we mainly focus on whether competitive and non-competitive interactions can positively impact user engagement.

For this purpose, we built a prototype of a gamified point system. The theme of raising pets was chosen in the proposed system because it can create a relaxing and pleasant environment for user interaction.

New input (mission) is added in the gamified point system. To reward users for value-creating activities in shopping, we have designed new feedback including value point, pet and virtual food as new outputs. When the user completes the mission according to the instructions, the user will get a certain value point, and the level of his pet will be improved. Value point can be used to exchange virtual food and can be used to help pets recover energy. After some time, the pet's status will decrease, which means that the user needs to feed it. This constitutes a simple cycle. Users need to constantly get value points in exchange for virtual foods to keep pets healthy. Based on these game elements, our system provides users with social connections, including competitive and non-competitive interactions, to stimulate user engagement. Users can interact with each other by giving away virtual food or competing with pets. After that, we conducted an experiment. Users experienced the gamified system and filled out a questionnaire. From the experimental results of the questionnaire, we got positive evaluation from the experimenters.

This article is organized as follows. In Sect. 1, the introduction is presented. Section 2 presents related work. Section 3 and Sect. 4 introduces the design and implementation of proposed system. In Sect. 5, we present our preliminary evaluation results. In Sect. 6, we make a conclusion and come up with some ideas about our future work.

2 Related Work

In this section, we discuss previous research in the areas of point system, social influence, gamification, and augmented reality game.

2.1 Point System

Enzmann et al. [21] think that users refuse to use point system because they may fear an invasion of privacy. Therefore, they present two variants of a privacy-friendly loyalty system to be used by online vendors for issuing points. In the study of Coskun et al. [22], the design of Near Field Communication (NFC) enabled loyalty system on smart cards of NFC mobiles and development details are presented. NFC technology is a short-range, high frequency, and low bandwidth wireless technology which occurs between two devices within few centimetres. With this model, loyalty and payment applications share and exchange valuable information through NFC Loyal Database system on smart card. Lim et al. [23] study online loyalty programs from a searchability perspective. The goal of their research is to explain how searchability can influence participation in loyalty programs. All above research aims at increasing user engagement through utilitarian motives such as improving the security, convenience and functionality of current point system. Our research focus on enhancing symbolic motives, which are related to needs for self-esteem and social approval.

2.2 Gamification

Gamification refers to the application of using game design elements and game mechanisms in a non-game contexts to enable users to solve problems and improve the contribution of users [28]. Commonly, gamification employs game design elements to improve organizational productivity, user engagement and more. Lots of research about gamification indicates that a majority of studies on gamification reveal that it exerts good effect on individuals. The gamification techniques are aiming at leveraging peoples natural desires for achievement, competition, socializing or simply their response to the framing of a situation as game or play. Li et al. [29] design a gamified multiplayer software tutorial system called CADament. Compared with existing gamified software tutorial systems, their system generates engaging learning experience through competitions. Their study shows that their system has an advantage over pre-authored tutorials for improving learners performance, increasing motivation, and stimulating knowledge transfer. In the paper of Dergousoff et al. [30], they think classic ways of gathering data on human behavior are timeconsuming, costly and are subject to limited participant pools. Therefore, they combine both gamification and crowdsourcing techniques into a smartphone-based platform to motivate voluntary participation and provide researchers with a framework that can be used to investigate multiple research questions without the need to develop costly specialized games. For the purpose of inspiring customers, some ideas of combining game and marketing are proposed to engage customers. Zichermann et al. [31] thought that traditional advertising is losing effectiveness as competition for consumer attention and game playing is on the rise and vying for customers attention. Gamification is also used in education and health. Arawjo et al. [32] present a puzzle game that builds student understanding of programming concepts. Their results from a lab study demonstrate that novices can learn programming concepts by playing the game and the game was well received. In the paper of Zhao et al. [33], they present the design and findings of a study on the motivational effects of using activity tracker based games to promote daily exercise. The results of their study show that participants preferred the gamified exercise experience over regular exercises and features related to social factors played a relatively more important role in this game experience. The above research shows that gamification is a universal and effective means to increase user engagement. Our system incorporates gamification elements to enhance user experience.

2.3 Social Impact

The social impact is particularly significant in commerce. For example, many people read what other people think about products by logging on to social media sites before making a purchase. Social media users trust what their friends, family, and even strangers say online about a brand or product. Instore shopping decisions are also affected, as customers use their mobile devices to look at reviews and ratings to reinforce their purchasing decisions [24]. Lee et al. [25]

proposed a multi-phased model for internet shopping, which fully takes the characteristics of the internet and cyber shopping into consideration in their paper. Their results indicate that diverse communication affects the level of trust. If customers share more values with other customers and if they have more diverse means of communication, they would intend to revisit the site more repeatedly. In the study of Zhu et al. [26], they designed and ran an experiment to measure social influence in online recommender systems. Their results show that social influence could sway peoples own choices significantly. Li et al. [27] found that emotion played a significant role in the mobile consumption experience in their research. They suggest that attention should be paid on the social communication process between humans to improve consumption experience. The above research shows that social influence has a positive effect in commerce. Our research is based on the combination of social influences and commerce. Specifically, we have designed two kinds of user interactions in our system to study how different social types affect user engagement.

3 System Design

3.1 System Overview

Our system is designed based on current point system: 1) Users can earn points by purchasing goods; 2) The redemption rate of the gamified system is the same as the current system. We propose a multi-user approach based on game design in the system to improve user engagement. A theme of keeping pets is selected in the proposed system, because 1) pets can be used to reflect the status of users; 2) as it is easier to exchange virtual food in the game, users can obtain satisfaction from accumulating value points; 3) the theme of pet raising can create a relaxing and pleasant social environment for multi-user interaction.

In the current point system, shopping is input and point is output. Point can be used as a financial incentive to motivate users to purchase, but they cannot support value creation in shopping. For example, environmental enthusiasts may want to buy energy saving lamps because it is good for the environment, not because it accumulates more points. Therefore, we design a gamified point system based on the current system framework. As shown in the Fig. 1, the solid line part represents the current system framework, and the dotted line part is our new design. Our system consists of several game elements including mission, value point, pet and virtual food. Mission is the goal for shopping. To motivate users to complete mission, value points, pets, and virtual food are designed.

The mission is to remind users to create value in shopping. It is given during shopping and confirmed at checkout. If a user selects one mission that requires the user to buy low-calorie food, the information obtained by scanning the bar-code of the product will be used to confirm whether the mission is completed or not. Users are free to choose different mission they are interested in.

Feedback is designed based on the pet. In our system, every user can feed a pet. The pet will get experience value (EXP) if the user completes the mission. If the EXP of the pet reaches the threshold, the pet will level up. Therefore, the

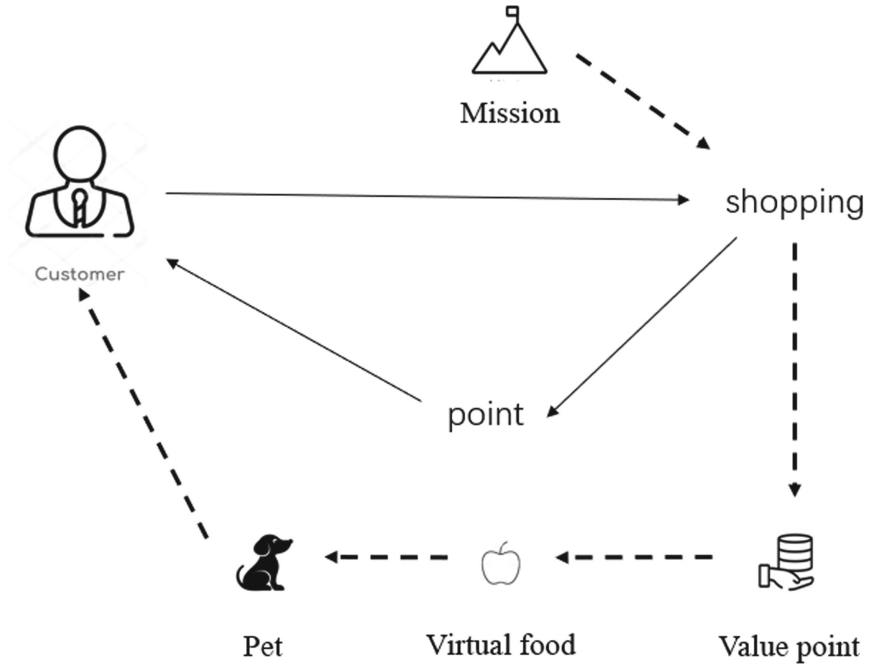


Fig. 1. The process of shopping when users use the gamified point system.

level of the pet reflects the status of the user. The pet also has energy and it gradually loses. The user needs to feed the pet with virtual food. Virtual food is purchased with value point. Value point comes from mission completion. This constitutes a loop that encourages users to complete mission.

3.2 User Interaction

In our design, we use user interaction to attract users and help them create value in shopping. We explore two modes to motivate users, competitive and non-competitive interactions.

3.3 Competitive Interaction

In the competitive interaction mode, users can compete with other users through the network. Figure 2 shows a scenario where three users participate in a competitive interaction. Each user has a smartphone with a gamified point system. When three users want to participate in the competitive interaction, they can join the competition room at different places. When everyone joins the room, the match result based on the level information will be displayed in the competitive interaction interface. It motivates users to continuously improve their pets to win the game.

To this end, we have designed user interfaces for competitive interaction across the network. In this interface, users can see their pets. When each user joins the competitive interaction room, the gamified system will obtain the level information from the database and display it as the pet level. In this interface, our system will give ranking results. Specifically, when the first user joins a room, a new room is automatically created and a pet with level information will be displayed. When subsequent users join the room, the room and pet information will be synchronized. When there is more than one user in the room, the system will give a ranking result based on their level. If there are two users in the room, the higher-level pet will have a golden crown over it head. If three or more users are in the room, the system will display golden, silver and bronze crowns on top of pets ranked first to third. Figure 3 shows a scenario where three users participate in a competitive interaction.

3.4 Non-competitive Interaction

Non-competitive interaction is important in social relationships. In some multiplayer games, users can engage in non-competitive interactions, such as collaboration, sharing resources, or sending gifts to friends. In our system, users

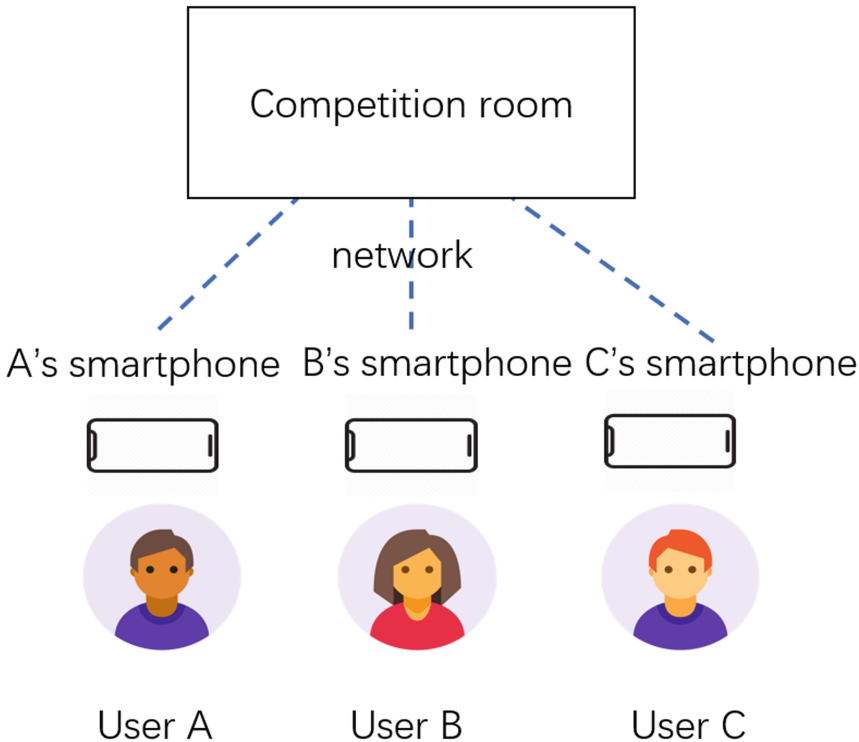


Fig. 2. Three users enter the competition room for cross-network competitive interaction.

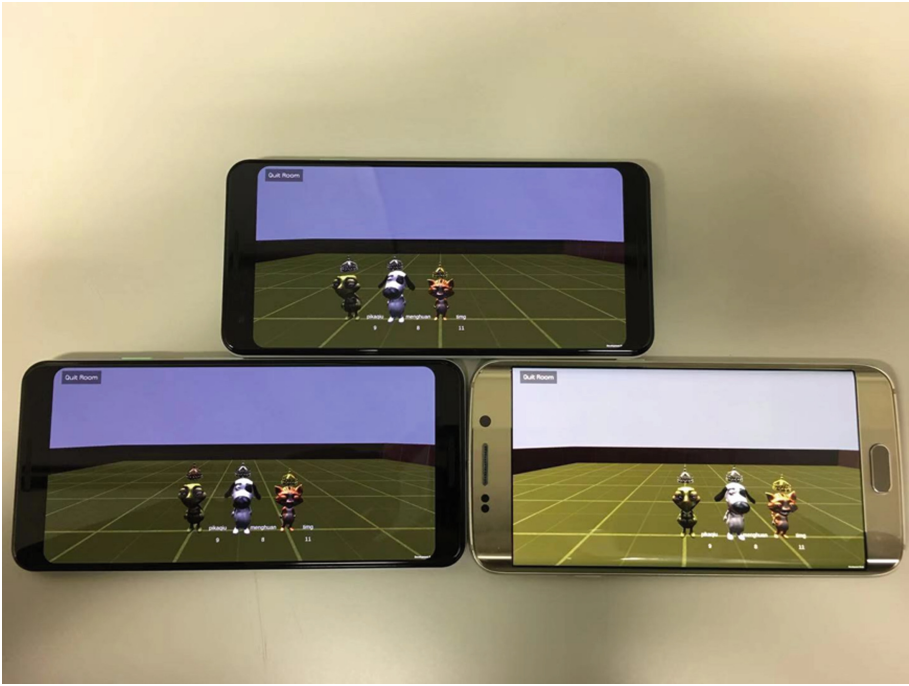


Fig. 3. Competitive interaction interface after three users join the competition room. The user name and pet level are displayed to the right of the pet. The system will give ranking result according to pet's level and display the crown with corresponding color on pet's head.

can socialize in a non-competitive way, in which users can give virtual food to friends (see Fig. 4). Value points can be used to buy virtual food, which is a reward for completing mission. Such a design motivates users to get satisfaction from exchanging rewards.

Users can purchase virtual food with value points in the non-competitive interaction interface by clicking the value points. When value points are spent, the volume decreases. The virtual food will be displayed in the interface. Users can click virtual food to feed their pets or give it to their friends. If the user chooses to feed his pet, the pet will get a certain amount of energy and do some action. If the user gives food to a friend, the virtual food will disappear. The recipient will be able to see a virtual food displayed on the interface with a label indicating who gave the gift.

Both designs attempt to engage users through interactions between users. In the competition mode, users can gain a sense of accomplishment from defeating other users. In the non-competitive interaction mode, users can gain the joy of accumulating value points by sharing the virtual food with their friends.



Fig. 4. Users can click virtual food and send it to others over the network. The yellow coins are value points. Banana is the virtual food. The user name is on the left of the pet, and level information is on the right. (Color figure online)

4 Implementation

The main hardware devices used for the development of our prototype system include a tablet PC and a smartphone. Windows 10 Home Edition is installed in the tablet PC. The processor is Intel(R) Core(TM) i7-6500U CPU @2.50 GHz 2.59 GHz. The RAM is 8.00 GB. The development software is Unity 2017.2.0f3 (64-bit), a cross-platform game engine. Unity 3D is used to build and render our three-dimensional system. Vuforia SDK is used for augmented reality implementation, which uses computer vision technology to recognize and track images. After recognizing the image of point card on the smartphone, virtual objects created in Unity 3D will be superimposed on the smartphone. After that, users can see the 3D objects and interact with them. Photon Unity Networking is used to implement the competitive interaction. It is a Unity package for multi-player games. Its matchmaking gets players into rooms where objects can be synced over the network. Models and text are synchronized across the network, enabling multiple users to compete at different place. As for the database, we used WampServer Version 3.0.6 32bit consisting of the Apache web server, OpenSSL for SSL support, MySQL database and PHP programming language. Apache and MySQL are always running on the server. Communication between the mobile devices and the server is implemented in PHP.

Our system is implemented based on client-server network structure. Gamified point system will be deployed on mobile device as a client. The retailers can manage and update user information in the server. Users access data when registering their own information and obtaining their information from database. We use the WWW class and the WWWForm class to send and receive data from Unity. When receiving from the database, the information is converted to JSON format and received. After receiving it on the Unity side, it is decoded into a string format.

5 Preliminary Evaluation

In this section, we introduce preliminary evaluation and analysis of results. We asked participants to do online shopping using our gamified point system. The main purpose of this research was to test whether our system can provide interesting feedback during shopping, thereby providing a good shopping experience for users, and whether the interaction of our system is easy to use because they are important factors to engage users. We will also discuss the feedback received from the survey.

5.1 Participants

We invited 5 participants (3 females and 2 males) from 20 to 27 years of age. All participants have basic computer skills. All of them have experience with online multiplayer games. All of them have experience using the current point system.

5.2 Methods

All participants were given a brief introduction of the system for approximately 5 min. Before each study, we introduced participants to the basic operating procedures of the system for approximately 10 min. First, users browsed the mission interface in the gamified system. Then they opened the shopping website through the link provided in the system. On the shopping website, users can complete the corresponding mission by purchasing products that meet the requirements. When users wanted to complete the mission of purchasing environmentally friendly products, they can choose products with an eco label. If users wanted to complete the mission of purchasing a local product, he can browse the information of the place where the goods are produced. Completing health-related mission required users to purchase products that meet health food standards. At checkout, the mission in the system was checked and the information in the database was updated. After that, users can use the point card and their smartphones to make user interaction in both competitive and non-competitive ways.

After the participants became familiar with the operation process, we asked them to use the gamified point system for approximately 15 min to make a complete shopping experiment.

After the shopping experiment, the participants were asked to fill in a questionnaire. The questionnaire has following 7 questions with 5-point Likert scale (1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly Agree).

1. The system is easy to use.
2. The interaction with the pet is useful or interesting.
3. The feedback for shopping is useful or interesting.
4. I can easily interact with other users in the system.
5. I can easily understand my shopping target in the system.
6. I can feel the emotional connection in the system.
7. The system can provide a good shopping experience.

5.3 Results

The results are shown in Fig. 5. Question 1, 2 and 3 are used to test the ease of use and usability of the system. They mainly concern whether it's easy to use the system. The average score of question 1 is 4.8. The results prove that the system is easy to operate. Question 2 is used to test the usability of the pet-based interaction, The average score of question 2 is 4.4, the results shows that participants agree that interaction with pet is useful. Question 3 is used to test the usability of the feedback for shopping, The average score is 4.6. All the results show that the gamified system is still easy to use after adding new game elements.

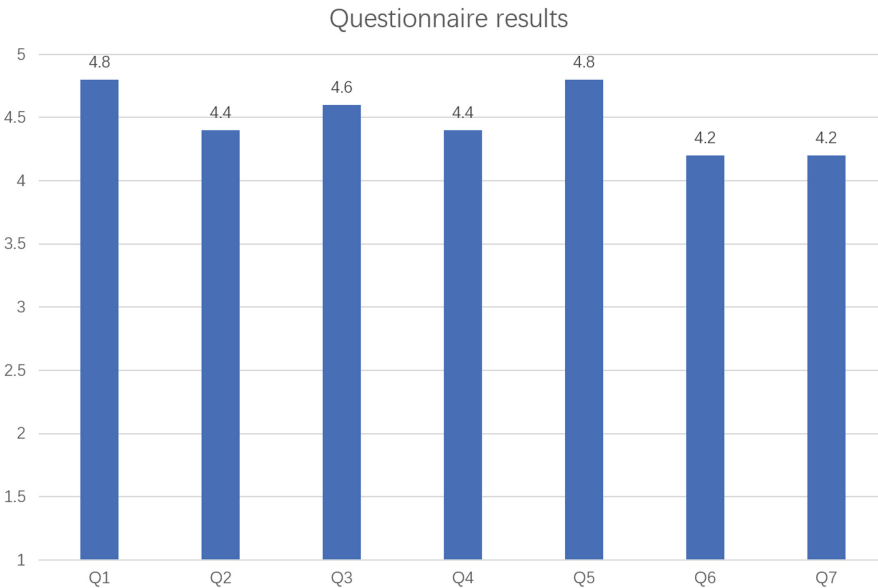


Fig. 5. Users can purchase virtual food and send it to others over the network.

Questions 4, 5, 6 and 7 are used to determine whether our system can give users a good shopping experience. The average score of question 4, 5, 6, 7 is 4.4, 4.8, 4.2 and 4.2. The results shows that participants agree that using our system can easily interact with other users, understand what they need to do and get a good shopping experience. The question 4 shows that our system supports user interaction well. The question 5 is about the guiding value of the mission. The results prove that users agree with the value of the mission. The question 6 shows that pet-based gamification design establishes an emotional connection between users and the system. The question 7 reflects that users recognize the value of the gamified system for improving the shopping experience. One participant believes that using our system can better promote user engagement compared to the current point system. Current point systems usually encourage users to spend through reward point, but it cannot establish a connection between the user and the system. Our gamification system uses pets as intermediaries to build a bridge between users and the system, and provides possibilities for user-to-user interaction.

Overall, we got a positive feedback through the preliminary user study.

6 Conclusion and Future Work

In this paper, a gamified point system on mobile devices is introduced. Gamified point system presents a method for engaging users using multiplayer game design. As an important advantage over current point system, each user can participate in a game experience to interact with others.

In the future, we want to investigate other important elements multiplayer games, such as collaboration and team work and further investigate the effects of each game element. In addition, we hope to further objectively evaluate the effectiveness of our gamified point system by conducting some experiments. First we will compare our gamified point system with baseline condition if our system increases engagement and duration by evaluating usage. We will then evaluate the game elements in the system. We will evaluate three mission (buying local goods, buying low-calorie food, and buying recyclable goods) by assessing the completion rate. Types of pets (cat, dog, turtle) will be evaluated to understand the impact of the pet. We will evaluate variation of user interactions to study the impact of different interactions.

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