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RESEARCH PAPER

Purchasing and Consumption Modification Among Iranians Throughout Gamification

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ABSTRACT

Optimal consumption is known as a nowadays concern which is related to scientific improvement, development of technology, product design, design and development based on standards, proper distribution of resources and, consequently, advancement in other less considered areas. Considering marketing, people are persuaded to purchase and consume the products throughout the gamification principles, even if this is more than the users' needs. This cross-sectional study focused on consumption patterns and gamification. The main objectives of this research was to provide a modified pattern of purchasing and consuming bread through persuading the families. This study was done by simulated gamification patterns and assessment of participants' feedback. The data was collected through literature review and interviews from a sample consisting of 25 students in the primary school. The results showed that gamification as a main factor was an appropriate stimulus for persuading purchasing and consumption behavior modification. However, the addition of mechanics in a relationship is not enough per se; reinforcement is required to enhance the quality of the perceived experience.

KEYWORDS: *Persuasive design; Gamification; Consumption pattern; Behavior modification.*

1. Introduction

Over the past few years, the use of game design for economic purposes has rapidly grown among scientists. Games are good motivators; they are one of the most powerful human resources focusing on three components of pleasure, rewards and time. Uniquely, games can predictably assist a person to do things without any force. In 2011, Zichermann and Cunningham published a book entitled "Gamification by design", in which gamification is defined as a process which helps users think and solve problems through gamification and game mechanics [1]. Gamification persuades individuals to engage in interactive behaviors; it motivates them to show productive behaviors [2]. Following the success of social network services (e.g., Facebook), games (e.g., Angry birds), and location-based services (e.g., Foursquare), marketers, have begun to use gamification to influence users' behaviors. This happens in almost every market. At present, gamification is used in many areas, such as EcoIsland, GetGlue, Fitocracy and even Mindbloom [3]. The general principles of behavior in many products are gamified, even if the product developers are not fully aware of this fact. For instance, the well-known footwear manufacturer, Nike, used gamification principles; to encourage people to run, it produced a product called Nike Plus [4]. Obviously, a key accelerator is the constant evolution of technology which has created new interaction rules which transforms the power of companies and organizations, and empowers the consumers. However, it seems that gamification excitement has no particular technological or scientific basis. Few theoretical or practical works have been done on the game design of products, services and activities from sociological, psychological or design perspectives [3].

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The use of persuasive technologies provides the designers with the opportunity to guide individuals' behaviors in a game environment without coercion. The recent convergence of different fields i.e., information technology and communication design, implementation, storage, transmission of knowledge has created new opportunities [5]. In addition, the rapid growth of the internet of things and smart homes has provided the conditions for designing in this area. Nowadays, smart systems can identify objects, understand spoken and written languages, speak, move and make complex arguments [6]. Knowledge management can also integrate different groups or sections which are located at different geographic locations, and can promote a rapid and effective transmission of knowledge [7].

2. Gamification

The term gamification was coined in 2003 by Nick Pelling; however, it was publicized in 2010 [8]. Some individuals use the term as explicit games which advertise products or services, create 3D virtual environments which change behaviors or train users in complex systems [1]. Walz argues (2015) that to introduce gamification as a design tool, one must understand the range of social and psychological processes involved in designing and consuming such products, services and activities. Figure 1 illustrates the status of gamification in design. Accordingly, entertaining and game design describes a subset of emotional design which in turn can be identified as a subset of persuasive design. In fact, motivation is another tool close to the ultimate goal of changing the target behavior of some audiences. However, entertaining and game experiences are only a small subset of desirable, enjoyable and motivating experiences [4]. In general, techno social systems which attempt to bring about behavioral changes in the use of common products such as energy and water are often referred to as persuasive systems or behavioral change support systems. Persuasive systems are defined as interactive systems designed to change attitudes and / or behaviors. This definition is similar to that of behavioral change support systems. In other words, a technical-social information system with psychological and behavioral outcomes is designed to shape, change or reinforce attitudes and behaviors or to persuade without the use of force or deception [9]. In fact, for any behavioral change, one must be able to take action and be motivated to do so.

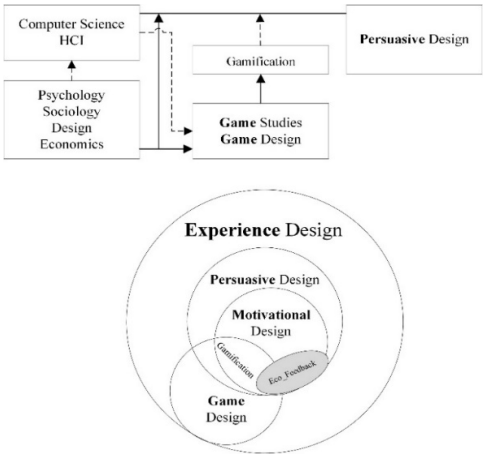


Fig. 1. Gamification status in the field of design (3)

Those who advocate the benefits of gamification often prospect a future in which all life and work will increasingly be playful and rewarding. They believe that the world's problems can be solved through fun activities such as games which simultaneously stimulate and delight the participants. In addition they advocate that game environment provides useful services for science, charities and industry [3]. The need for a formal and well-known game design led to the development of MDA (Mechanics, Dynamics and Aesthetics) framework by Hunicke et al. (2004). MDA is a formal approach to understand games; it attempts to bridge the gaps among game design and development, game criticism and technical game research [10]. However, Werbach (2012) classified the game into the following three levels:

A) Dynamics: constraints, emotions, storytelling, progress, and communication
B) Mechanics: rewards, challenges, feedback, chances, competition,

collaboration, transactions, turns, and declaration of victory

C) Game components: points, badges, ranks, standings, missions, achievements, roadmap, networking, and teamwork.

Werbach (2004) considered the game foundations as general and conceptual aspects of the game and introduced them as hidden grammar or rules. Foundations accompanied by the aesthetic aspects of games (i.e., visual or audio features), which are one of the most important fun elements of games, create enjoyable experiences; stimuli include actions, behaviors and user-related control mechanisms regarding game content.

2.1. Mechanics and dynamics of the game

Game mechanics are the rules which make the game process; they make the game fun, challenging, satisfying and motivating. These emotions are caused by human needs and motivational methods called game dynamics [12]. Humans have basic needs for reward, fame, success, prestige, competition and altruism in social life. These needs are universal; they exist across different generations, races, cultures and genders. Game designers have had the knowledge of applying these needs to the game environment. Gamification has recently made use of these strategies more widely [13]. Below are some of the most important game mechanics(Table 1) and dynamics (Table 2).

Tab. 1. Mechanics of games (1)

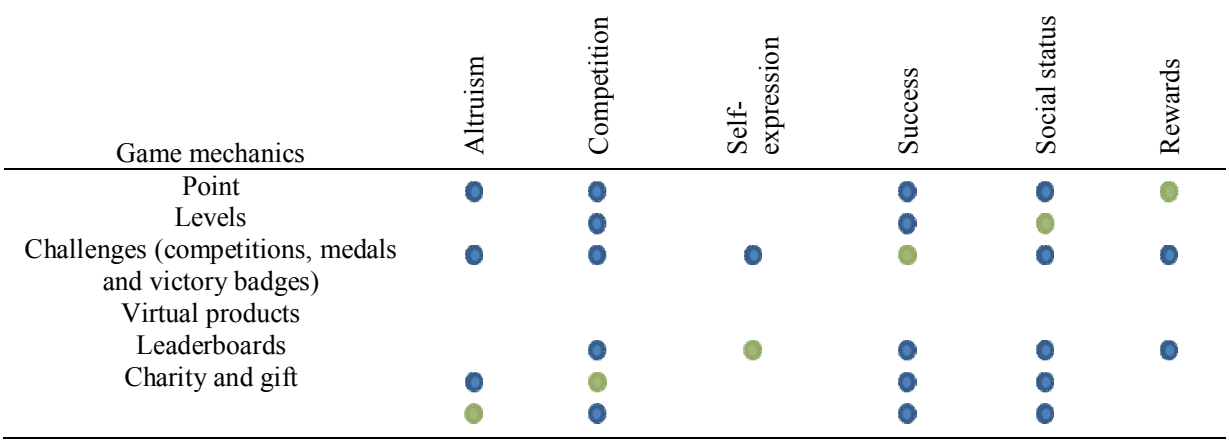
Mechanics	Description
Points	Points are considered a bonus, and reflect the status of the user. Even when there is no material value, individuals like to be rewarded, and feel that they have gained a benefit.
Levels	Levels are usually marked with a certain amount of points; users automatically go to higher levels based on their participation. In some applications, they indicate accessing to some capabilities.
Competitions, badges, medals	The key to this mechanic is that you design the competitions and goals based on the activities you want to pursue; you give the users victory badges and medals of honor.
Virtual products	To be effective over time, a game's economy needs an environment to consume points; this gives incentive to collect more points. Virtual products are good tools for competition and self-expression.
Standings (leaderboards)	Most successful games use a table to display the highest points; it creates enthusiasm and fame. In gamification, competition between users is used to stimulate valuable and desired behaviors.
Races	Races enable users to challenge other users and compete for more points in an activity. Races can be used to add multiplayer options to solitaires.

Tab. 2. Dynamics of games (1)

Dynamics	Description
Rewards	Rewards (tangible or intangible) are presented after performing an action (behavior) with the intention of repeating that action (behavior).
Positions	Most people need social status, fame, prestige, attention, self-esteem and respect. Almost all game mechanics meet this need.
Success	Some people are motivated by trying to achieve something difficult and wining. The reward that gives them the most satisfaction is social recognition and achievement.
Self-expression	Many people need a chance to express their independence and authenticity to make themselves unique and different from others. One's avatar can be considered a rich focal point for his self-expression.
Competitions	When a competitive environment is created and the winner is rewarded, higher levels of performance are achieved. This happens because we gain satisfaction by comparing ourselves with others.

The medals, earned points, and being among the best players at leaderboard confirm that the individual has achieved something valuable. In Maslow's words, it leads to a sense of confidence, value, power, ability, competence, usefulness, and necessity in the world. It results in increased effort and engagement [14]. Figure 2 shows the relationship between human needs and game elements. Green dots indicate the basic need which a mechanic addresses, and blue dots identify other areas of influence.

Fig. 2. The relationship between human needs and game mechanics (13)



However, gamification should not be limited to simple game mechanics, such as points, medals and leaderboard. This view is a simple approach to gamification and leads to the failure of this system [15]. Yu-kai Chou considers gamification as more than game mechanics and foundations; he introduced eight stimuli for gamification (Table 3) [16].

Tab. 3. Eight focal game stimuli (16)

Stimuli	Description
Epic Meaning & Calling	Semantic epic is the driving force in which a player believes that he is selected to do something. This happens when the person has an early chance. For instance, he thinks that he has received a gift while others did not.
Development and achievement	Internal development and achievement include developing skills and ultimately overcoming challenges. The word *challenge* is very important; no medal or prize is meaningful without any challenge. This is also the driving force in a simple design; points, medals and managers mainly focus on it.
Empowering creativity and feedback	Empowering creativity and feedback occurs when users engage in a creative process in which they have to form things over and over and try different combinations. Not only do people need some ways to show their creativity, but also they must be able to see the outcome of their creativity, receive feedback, and respond to it.
Ownership and possession	One with a sense of ownership deeply wants more gains. Furthermore, if he spends a lot of time customizing his profile or icon, he automatically will acquire a complete ownership of it.
Social Influence & Relatedness	This stimulus includes all social elements which guide people, such as coaching, acceptance, social responses, companionship, competition and jealousy. This relatively good stimulus has been well studied because many companies have a high priority in optimizing their online social strategies.
Shortage and despair	This is the impetus to ask for something you cannot have. Many games have appointment dynamics (i.e., come back 2 hours later for receiving your reward). The fact that people cannot get something right now motivates them to think about it all day long.
Unpredictability and curiosity	If you do not know what is going on, your brain is thinking about it. Many people watch movies or read novels because of this stimulus. However, this stimulus is a major cause of gambling addiction.

Loss and avoidance	This stimulus is based on avoiding negative events. On a small scale, loss of previous work can be avoided. On a larger scale, acceptance of uselessness of what you have done to gain the point can be avoided. In addition, the missing opportunities use this stimulus because people feel that if they do not act immediately, they will lose that opportunity forever.

3. Review of The Related Literature

Some research studies have been conducted on gamification, the summary of which is provided in Table 4. These studies were selected from among 30 ones with the objective of investigating the application of gamification in changing consumption pattern, behavior and attitude, increasing motivation and improving user experience.

Tab. 4. Review of the literature on gamification

Title of the study	Summary
A survey on the design of gamified systems for energy and water sustainability	In this study, the basic design principles and the main models of persuasive system were discussed. It used gamification and games with a purpose (GWAP) to engage users in sustainability; motivational mechanics which are often used to induce behavioral changes were identified, and a set of gamified systems to sustain energy and water was presented; general design rules were extracted; they were provided as possible guidelines for further research.
Examining the impact of gamification on intention of engagement and brand attitude in the marketing context	A qualitative exploratory study using two separate groups was conducted. 1,500 students participated in the study. In addition, a five-point Likert scale was used. Findings showed that perceived usefulness rather than ease of use positively affected brand attitude. However, it could not affect attitude and behavior for a long time. Social influence did not have a positive effect on people's intention of engagement; however, it had a relationship with brand attitude. Moreover, perceived enjoyment was the strongest predictor of intention to participate in the gamification process. In addition, it significantly influenced brand attitude in the gamification process.
A systematic review of gamification in e-Health	A systematic review of 46 studies was conducted to examine the various strategies used in e-Health and to explore the benefits and problems of this emerging field. The results showed that although there was a great deal of interest in this technology in recent years, there was still no credible empirical evidence in this area. In addition, most electronic applications and serious games contributed to short-term engagement just with external rewards. Therefore, it was necessary to develop e-Health strategies for grounded theories which are based on focal experiences and psychological effects of game mechanics.
Smart technologies and shopping experience: Are gamification interfaces effective?	This study analyzed the impact of game mechanics (i.e., challenge and fantasy) as a broad tool on designing smart technologies, customers' experiences, emotions and behaviors. 240 individuals took part in the first phase of the study; they were asked to present a key slogan for printing on the new laptop case. For the sake of intervention, a challenge and a fantasy mechanics were considered. In the second phase of the study, the performance of two personalized interfaces gamified with two mechanics (i.e., challenge and fantasy) was compared with that of a control group with a classical interface. The findings supported that the personalization of a product through a gamified user interface had a positive impact on the experience of the process and the supportive goals. The study also showed that simply adding a gamification mechanism to a smart interface was not enough, even though it significantly enhanced the quality of the perceived experience.

Understanding how gamification influences behavior in social marketing	In Australia and many other countries, overweight is prevalent while physical activity is declining. This paper investigated the longitudinal effect of gamification on consumers' motivation and behavior in relation to physical activity from the perspective of social marketing. Therefore, a pilot design (i.e., a popular fitness program) was used to measure subjective motivation and walking behavior over four weeks. The results showed that gamification changed and sustained changes in behaviors; however, it did not affect subjective motivation.
Investigating the effect of gamification on learner driver behavior, perceived motivation and user experience	This study examined the impact of gamification on behavioral change, motivation, and user experience over a four-week period. To solve the problem of inexperience in driving, a smartphone app was designed and developed for Australian driving students. The purpose of the program was to make it easy for the learners to record compulsory training sessions; the learners were encouraged to practice more through gamification. The results showed that gamification exprience was more enjoyable and more motivating; however, no significant change in behavior was found. This necessitates further research on effectiveness of gamification to encourage behavior change.
Visualizing and gamifying water and energy consumption for behavior change	This paper focused on the development of practical programs to change behaviors and save water and energy consumption. Furthermore, a set of design guidelines was proposed for visualizing and gamifying water and energy consumption. Then, its validity was measured using prototypes implemented in real-life experiments with several thousands of smart families. Some examples of design guidelines are as follows: • Overview of consumption should raise awareness, and provide detailed information on specific actions. • The objectives should be specific actions that users can take. • Consumer feedback should be operational and should include visual guidance. • Real reward should engage more active users. • Common goals (e.g., familiarizing neighbors with each other) have the potential.
A gamification framework for customer engagement and sustainable water usage promotion	The emergence of smart meters increases the efficiency of water demand management (WDM) and helps water services to collect consumption data to monitor network status and develop models of consumers' behaviors. Consumption data can make users aware of their habits. In this paper, a gamification program was proposed to increase users' participation and to collect real data. In addition, the design principles were described. There was an integrated approach which used digital games and board games to motivate users to send meaningful data on water and electricity. Moreover, the long-term behavior change was described. This study was a part of the SmartHO2 project, which aimed to create an ICT platform to increase customers' awareness of their consumption and to pursue water usage promotion in the residential sector.

Gamification and sustainable consumption: overcoming the limitations of persuasive technologies	To support sustainable consumption patterns, ICT applications have been developed to encourage green consumption in the context of persuasive technology. However, these systems have been criticized for two reasons. First, they often assume that information (e.g., information on individual energy consumption) changes behavior or changes awareness and attitudes which lead to behavior change. Second, they assume that the system designer begins with objective criteria for *sustainable* behavior; they can apply the criteria in the context of applications. In this study, the potentials of gamification to overcome the limitations of persuasive technologies were investigated. Gamification opens up a wider design space for ICT applications created to support sustainable consumption. It gives the user more autonomy in choosing goals and linking individual actions to social engagement. Based on this discussion, the essential requirements were defined as guides in the gamified persuasive design for sustainable consumption.

4. Modifying Consumption Patterns Through Gamification

Modifying consumption patterns requires a sustainable cultivation; it requires some strategies to make all individuals in the community feel the need to change their consumption behaviors. Gradually, this reform is institutionalized and turns into a sustainable behavior and a culture in all areas of consumption. Therefore, proper strategies should be implemented to train and set standards nationwide. Related organizations need innovation to achieve these goals. Innovation focuses on the engagement of user needs and technological opportunities for organizations [25]. Applying the principles of gamification can be effective in this cultivation process. This is the theory through which Opower helped millions of people to reduce their energy bills. In fact, instead of selling or producing energy, Opower developed one software which is changing Americans' energy consumption behavior through creating competition among people. In this regard, information technology helps organizations achieve goals related to users or customers' needs faster and cheaper [26]. Opower discovered that when it comes to optimizing energy consumption, conscience, as well as competition, cannot be motivating to positive changes. In addition to giving feedback on energy consumption, Opower provided a user report containing a graph of the energy consumption of each household compared to the mean of community consumption and mean of the best consumers' consumption (i.e., the consumption of those who consume more efficiently) with a smiley. According to Professor David Stallman, the habit gained in this way can stay with the person for the rest of his life because it is difficult to change people's habits but it is easy to sustain the habit they have learned [27].

Opower's strategy can be generalized to other sources of energy and consumption patterns. Disposal of bread scraps is currently a major problem in Iran; it puts a heavy burden on the country's economy. About 30% of these scraps are discarded at the consumption phase. A major part of the bread scraps' disposal occurs during transportation, storage, and consumption at homes or restaurants (Haghayeghi & Ghodsi, 2009). The annual consumption of bread and cereals in the country, which is about 2 million tons per year, has ranked the country as the biggest consumer compared with other countries. According to statistics, Iranians buy bread two or three times as much as European countries. But this difference is not due to the high amount of bread consumption in the country since much of the purchased bread is discarded. Because of the importance of this issue and in order to modify the consumption pattern, the game design principles were used, and the effect of gamification on reducing the amount of bread waste was investigated. Regarding the product consumption, consciousness raising on optimal consumption through schools, media and producers is beneficial because purchasing surplus bread on a daily basis is one of the causes of increased bread waste. Other causes of bread waste in Iran include wheat and flour problems, baking problems, and problems with bakeries [28]. This study just focused on wastes considering the families' purchasing and consumption patterns.

5. Method

Reviewing the literature on the principles of gamification, consumption patterns and game design, and understanding the status quo, the

researchers examined the persuasive and behavioral aspects. In addition, the school context was chosen to modify the purchase and consumption patterns of families. In fact, behaviors should be established at an early age and school is the most appropriate place for behavior modification because of the conditions such as the age of the students and their ability to learn, accept and store information, the availability of educational factors, the large number of students and, consequently, the broadening dimensions of education, students' relationship with family members, and generalization of educational issues. The effective factors mentioned in the literature on household bread waste include the number of family members, families' socio-cultural class, the number of purchased bread, the number of bread shopping time, the waiting duration at the bakery, families' bread consumption, surplus purchase, household income, household expenses, bread type, eating habits, household educational level and bread storage way. Given the limitations of the experiment, some of these variables were considered.

Based on the reviewed literature, gamification principles were designed to be tested on a group of students through an intervention study. Therefore, Werbach, et al. (2014) six-step framework of game design was used (see Table 4).

Tab. 5. six-step framework of game design

Steps	Description
Specifying objectives	The objectives include those which motivated the gamification process; not what the players might achieve in the gamification system (e.g., points and medals).
Describing the expected behavior	Based on the overall purpose or objectives, the expected behavior must be known. These behaviors must have the following characteristics. They should be specific; the unit of measurement of success should be specified; an analysis to measure the proposed path based on the above criteria should be conducted.
Describing the target group (users)	To be successful, one needs to have a thorough understanding of the target group. Information on the age range of the group, frequency statistics, income, place of residence, and behavioral and personality traits should be known. It is important to know what motivates them to play and to continue playing. According to Barthel's theory, players are classified into four different groups according to their expectations. 1. Killers: those who play the game in order to succeed and win; they have no other purpose than competing with competitors. 2. Achievers: those who play to achieve the objectives of the game and to enjoy it. 3. Socializers: those who play with the purpose of engagement with others. 4. Explorers: those who play to gain a new experience and to explore surprising situations [29].
Producing activity loops	The elements of a game in a gamified system can be considered as loops. This section examines two main groups of activity loops in the game. 1. Challenge loops: at the lower level of the game process, these loops are responsible for advancing the game and achieving the objectives of the game. In fact, motivation leads to action; action has positive feedback. Eventually the feedback will motivate you again, and this process is repeated. 2. Progress loops: at higher levels of the game, these loops drive the overall and step by step game processes. In fact, going through several challenging levels will eventually lead to the main level.
Paying attention to the concept of enjoyment	The idea is to make gamified systems automatically enjoyable. However, all features and elements of the game can be used to make it enjoyable. It is not the case that a limited number of game elements are responsible to crate enjoyment and the rest of elements have other tasks. By correctly considering the design objectives as well as the game elements, you can create enjoyment in any situation of the game.

Using appropriate tools	The final step in game design is to choose from among the available elements. When all previous steps are taken with diligence and accuracy, needs and choices can be detected. If the previous steps are taken correctly, it is not difficult to choose appropriate tools to design the overall game structure.

In the first phase, by the teacher's guidance, the initial forms were designed; the students were asked to paint the number of bread consumed at their home. These forms were initially given to two brothers in the same family to assess children's attention to consumption and their ability to fill out the form. Then, through convenience sampling, a total of 25 students were selected to take part in the experiment during 20 days. Actually, one of the public schools in District 4 of Tehran province was selected. During a one-hour informal meeting, children discussed the way bread is purchased and consumed in their family, the types of bread and bread disposal. According to educational rules, it was not possible to take photos and films during the experiment. However, useful and practical judgments were made on children's performance at all stages. Considering the children's behaviors, some criteria such as the desire for self-expression, competition, attention, effectiveness and role play were used in designing the gamification principles.

5.1. Phase one: without using the principles of gamification

In this phase (without using the principles of gamification), the children were provided with the relevant form. They had to paint the amount of their families' purchased bread and bread disposal in ten days. The parents were also asked to monitor their children during this period. After submitting the forms, the families' bread consumption and disposal were analyzed, and the top students with the least amount of bread disposal were encouraged in the class. Moreover, five students were excluded from the experimental group due to errors in filling out the forms. It is noteworthy that at the time of announcing the top students, the desire to earn points and the willingness to reduce bread disposal was clearly visible.

6. Phase Two: Using The Principles of Gamification

In this phase, it was attempted to apply the principles of gamification in an interventional way to encourage the reduction of the bread disposal. An example is provided in Table 6.

Tab. 6. Simulation of the gamification principles in the class

The used	Implementation	Description	
Points	In the first phase, each child's point was calculated; he was given a sticker considering his point.	Those whose disposal was below the class mean received a happy smiley sticker, and those whose disposal was above the class mean received a sad smiley sticker. In addition, the number of stickers was proportional to the distance from the mean.	
Levels	The students were classified into three groups; they were persuaded to gain more points to display their names on the screen.	The names of 10 top students were displayed on the leaderboard through storytelling method. The balloon form was used to display the students' names. The balloons moved from the bottom to the top; they were placed on the leaderboard according to the families' amount of bread disposal. In fact, the smaller the amount of disposal was, the lighter the balloons were and the higher they moved.	
Leaderboards	The bread disposal of each family was calculated in terms of percentage and relative frequency.		
Competitions, medals and victories	Students won a medal due to the reduction of their bread disposal.	The one who had the most impact on the reduction of the family's bread disposal would receive a special sticker. Generally, in	

Virtual products	They were able to help each other due to the reduction of their bread disposal.	the second phase, the students received a sticker due to the reduction in their families' disposal. They could buy some bread for orphans by delivering the stickers.	
Gift giving and charity	The students talked about the children who work.	The students were told that the malnourished children would be provided with bread due to the decrease in families' bread disposal.	 

7. Results

The investigations in this empirical study were conducted through persuasive experiments and simulation of gamification principles to modify consumption patterns. Although parents were requested to monitor their children, there was the limitation of careful monitoring of the experiment. Thus, quantitative results were not accurate. However, as shown in the table 7, the amount of the families' bread disposal decreased significantly, and the qualitative results of this experiment is evident in Figure 3. The results of the experiment, observations and personal evaluation of children indicated that persuasive context led to enhanced engagement, sense of responsibility and competition. Furthermore, given the desire for independence, self-expression, and the effectiveness of persuasive context, the process of reducing the bread disposal occurred faster.

Tab. 7. The comparison of bread disposal rate before the experiment and 20 days following the experiment (i.e., using gamification principles)

	Without using gamification principles			Using gamification principles		
Bread type	The purchased number of bread loaves	The number of discarded loaves of bread	The percentage of bread disposal	The purchased number of bread loaves	The number of discarded loaves of bread	The percentage of bread disposal
Lavash	169.5	11.25	6.63	167	5.5	3.29
Taftun	70	8.75	12.5	64	5	7.8
Barbary and Sangak	156.5	12.25	7.82	164	9.5	5.79
Other types	117.5	9	7.65	113.5	7.25	6.38
Total		34.6			23.26	

8. Discussion and Conclusion

Gamification at different stages increases the users' enthusiasm, and encourages them to follow up. In addition, as evident in the study, using rewards or leaderboards for extrinsic motivation and creating a sense of competition can be effective. Moreover, emotions such as competition, dominance, autonomy, choice, and engagement, which are sources of intrinsic motivation, are effective. Game design basically deals with creating a charm and improving users' experience of a product or service. Gamified consumption modification as a persuasive approach helps increasing feedback, keeps children's engagement at a high level, and empowers them. This method provides the users with short-term and achievable objectives to keep the levels of conflict and dependency constant.

Through the advancement of technology and smart homes, using internet system, monitoring all steps (from purchasing to recycling bread) and using gamification principles, it is possible to decrease the amount of bread disposal. In fact, with further research studies, it can be understood that this persuasive system can affect all behaviors, engagements, relationships among children, relationships between children and families and even relationships among families. The present study encourages conducting further research and suggesting gamification ways to modify consumption patterns. In fact, studies in persuasive contexts can be conducted with a

wider range of themes and different types of users. It is also recommended to conduct research studies on the time of purchase and consumption using smart devices, and to design and test the user interface.

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