**Designing a comprehensive model for evaluating the effectiveness of gamification projects with application in online education**

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**Abstract:**

The expansion of the use of new communication technologies and the impact that it has had on the culture, way of thinking and style of activity of its users, has created a change in various fields. Due to the increasing growth of gamification with different functions and in online environments, as well as the importance and necessity of effectiveness evaluation processes as one of the most important and necessary control activities, it is necessary to measure the success or effectiveness of gamification projects. According to studies, the dimensions, components and indicators of gamification effectiveness have not been identified in general and there is no comprehensive model in this field. Therefore, this study, while identifying the desired dimensions and variables, through Delphi method in four rounds and by purposeful sampling, has presented a comprehensive model to evaluate the effectiveness of gamification. The results showed that the effectiveness of gamification is affected by three main dimensions called user experience (with eight variables), behavioral changes and user achievements (with five variables) and motivation (with one variable). In addition to presenting a comprehensive and new model, the present study examines and evaluates the role of new variables for the first time.

**Keywords:** Gamification; Effectiveness; User experience; Behavioral changes; Motivation

**Introduction:**

With the rapid emergence and growth of new technologies, especially in the field of communication and digital technologies, electronic games are constantly growing, developing and dominating. The most popular new, exciting, and growing trend in this field that has involved experts in various fields is gamification, which researchers have briefly defined as "the use of game design elements in the non-game field" (Seaborn & Fels, 2015, p. 15). The main theme of this process affects the behavioral aspects and specific tendencies of the audience in a competitive environment. Upgrading and improving motivations, increasing user activity and engagement, strengthening positive patterns, motivating and helping to develop useful behaviors, increasing interactions, quality and productivity, changing behaviors, etc. are among the most important goals or achievements of gamification. (Hamari et al., 2014, p. 3028; Kim, 2015, p. 4).

The use of applications on smartphones or tablets can not only be defined and used for specific purposes, but beyond a communication process, it will also be an incentive to reflect people's behavior. Today, the use of gamification is growing and there is a great demand for the use of gamification in various fields. For example, in the field of education, play-based educational applications in active learning situations with active learners will give the best results (Hanus & Fox, 2014, p. 159) and even according to some studies, 79% Of students believe that if the educational activities are similar to a game in mobile applications, it will be much more effective (Oghuma et al., 2016, p. 45). In addition, effectiveness evaluation processes, as one of the most important and necessary control activities, prevent possible deviations, waste of resources and time, and increase the effectiveness of activities. Therefore, due to the growing use of gamification services as well as significant resources or costs for it, it is necessary for developers to use these systems to evaluate the feedback of activities and the success of the gamification project in achieving their goals. This is an important scientific and practical issue in the gamification process (Hamed, 2017, p. 3).

Although gamification has attracted a lot of attention, in general, academic and fundamental research in this area is lacking and researchers believe that gamification is still very young from a scientific point of view (Brito et al., 2018, p. 2). On the other hand, most previous research is about a specific sample, and this ability to generalize the results to other gamifications poses a serious challenge. A review of research records also found that only a handful of studies have shown how some gamifications with different functions are successful, while others fail. On the other hand, most people who study gamification often use a specific structure or model to organize and clarify the process (Brito et al., 2018, p. 5). But so far, the criteria for the effectiveness of gamification have not been identified comprehensively and there is no comprehensive tool or model that can measure the effectiveness of gamification. As a result, this research seeks to determine the dimensions, components and indicators of an effective gamification scheme, or with what comprehensive tools or models can the effectiveness of gamification be measured?

**Literature:**

There are several examples of previous research on the effectiveness of gamification. In 2018, Ab.Rahman et al. (Ab.Rahman et al., 2018) in their research on the effectiveness of gamification technique for the participation of higher education students in a university in Malaysia examined and identified some effective variables in increasing the effectiveness of a gamification with educational function. Researchers say that in recent years, gamification has become very popular in the development of education and enhances students' classroom experience, but there are still doubts about the usefulness of gamification among students. Regarding gamification evaluation, the data are collected based on the technology acceptance model and their research results show the effect of some variables in increasing and decreasing the effectiveness of gamification. Landsell & Hägglund (2016) in their research with the aim of providing a framework for gamification and game-centered organizational and business processes, finally introduced a model with 7 dimensions and 16 variables. The evaluation model of these researchers is in the form of a cycle, so that the evaluation process starts from key performance indicators and at the end of the process, changes after the last dimension affect the first dimension again and this cycle is repeated and the process continues. In their research, the researchers concluded that motivational issues (variables such as goals, emotions, mental state, reward and feedback) and value creation variables (such as performance, conflict, etc.) play a very important role and are at the center of this cycle. In 2015, Osipovo et al. In their applied research studied the effectiveness of gamification in online education systems and tested people's motivations and success rates. Their research is based on testing and reviewing an online application in the field of foreign language teaching among forty thousand people from both groups of language learners and language teachers, and in this process, the motivations of individuals and the success rate of activities have been calculated. Finally, the research output has been used to develop gamification-based educational processes and propose an effective method. After referring to the records and in order to answer the two research questions that were raised before, it is necessary to first define and identify the characteristics of an effective gamification, its criteria and indicators to design a comprehensive model for evaluating the effectiveness of gamification.

**Effective gamification:**

Researchers generally believe that the main purpose of gamification is to engage users, change their behavior and stimulate innovation, so the effectiveness of gamification is defined using several important aspects: user experience, motivation and change in behavior (Ab.Rahman et al., 2018, p. 3). The user experience argues that an effective gamification scheme should lead to a positive experience and should not adversely affect the user experience. In terms of motivation, the gamification scheme should motivate the user. The third case focuses on the effect on behavior (in other words, the results or outputs of gamification). Behavior change can be assessed through methods such as empirical studies (control group) or the study of mental structures such as measuring motivation or pleasure and satisfaction through questionnaires, interviews, etc.

**Gamification and user experience:**

User experience is a very important issue in designing effective, stimulating and attractive gamification, but due to its complexity, like the concept of gamification, it faces the problem of not having a clear definition and including different components. Experts are always faced with the question of how to build a system that users want, need, and use (Lallemand et al., 2015; p. 39). To create a good experience, users' understanding is essential. In the process of gamification design, it is necessary to pay attention to the compatibility or conformity of the conditions and goals of gamification with the conditions and goals of the user. It is also a great experience when users can easily achieve their goals in the system, and this experience is attractive and enjoyable, with appropriate and understandable language and attention to detail. It is important for users to find this game-centric experience fun, comfortable, exciting and away from issues such as cheating. Balance and coordination in difficulty, rewards and game progress create a pleasant experience for the user. User immersion or focus is a topic that deals with the extent and manner in which the user engages while interacting with gamification and has been studied in various studies. Numerous studies have shown that the presence of immersion variable leads to focus, spend more time and enjoyment of users, which has a positive effect on the intention to use the game (Sigala. 2015; Fitz-Walter et al. , 2015).

In the field of social communication due to gamification, people are influenced by several motivational experiences, such as friendly relationships between members, mastery of the structure that creates belief, power and achievements in achieving the goal, sense of management and leadership in realization Courage and greed in a group and shared experience (such as the reward and reputation gained for communicating in a game group). Sometimes players play in a social media or network, with a different feeling and perspective along with the social experience factor. This feeling is created because players define loneliness as interacting with the audience, being surrounded by others, and laughing with others or others (Sigala. 2015, p. 194). The gamification elements are also designed to arouse interested users, and for better understanding, they can be divided into three categories: mechanics, dynamics, and aesthetics. Game mechanics describe specific components of the game that represent data and algorithms. Dynamics refers to the life cycle of mechanics that is constantly used to engage player input and output. Aesthetics are actually related to the emotional part of the player. The user experience of these elements plays an important role in increasing the effectiveness of gamification.

**Gamification and motivation:**

One of the main and key elements in the process of gamification is motivation, which in most researches has paid attention to this issue and the importance of motivation that gamification creates. Motivation is the choice of a person to perform an activity and the amount of effort or resistance in it. In the current approaches, there are two main categories that play a role in determining people's motivation: internal motivation and external motivation, which are combined in gamification of these two motivations. On the one hand, rewards are used to increase user engagement, and on the other hand, efforts are made to achieve dominance, independence, and a sense of belonging in order to evoke emotions. In gamification, the main emphasis is on external factors of motivation, especially activities that the user is not motivated to do.

**Gamification and behavioral changes or user achievements:**

In research that measures the impact of gamification on user behavior, different structures and criteria are used, depending on the situation in which gamification is used. Such as completing tasks (volume and variety of tasks), performance of tasks in terms of productivity, changing user behavior, etc. (Hamari et al., 2014, p 239). Once you understand how to keep the player motivated in the process, it is important that the player is involved in the process. Engagement is another key element that describes the effectiveness of the gamification process through five indicators: "time" (average time interval between two executable activities), "repetition" (frequency of repetition of activity at a time specified by the user), "duration (Time used to participate in the activity), "learning" (the amount of learning of an activity from one player to another) and "ranking" which deals with the customer. In the discussion of behavior analysis, one of the important variables is the study of attitude, and in recent research, it has been concluded that attitude has a great impact on understanding the behavior of the consumer or user. A person is willing to do something if he has a positive attitude towards doing it. The impact of attitude on behavior is so high and important that in the theory of Reasoned Action (TRA) proposed to explain behavioral intentions, the only important factor before actual behavior is a person's intention or intention to do something or behavior. Also, only two variables of attitudes and mental norms shape behavioral intentions and behavior (Fishbein & Ajzen, 1975). Researchers believe that the variables of ease of use (indicator of users' expectation of effortless gamification) and the benefit of using gamification (degree of users' belief that the use of gamification has improved their performance) are two factors affecting users' attitudes toward gamification (Ab.Rahman et al., 2018, p 4). Another of these gains for the user could be gamification efficiency and financial value (Kumar & Herger, 2013, p. 530).

**Research Methodology:**

With in-depth studies on scientific texts and extensive literature review, several initial variables in the field of gamification efficiency were identified and a wide range of important and effective variables and dimensions were included in the initial research model. By studying these factors and their classification, the initial dimensions and variables of the research were determined. In this basic framework, the effectiveness of gamification consists of three main dimensions. These dimensions are: user experience (consisting of 9 variables and 44 items), behavioral changes and user achievements (consisting of 5 variables and 28 items) and motivation (with one variable and 4 items). One of the common applications of the Delphi method is to create general models or to develop and extend them using the opinions of experts. While most surveys try to answer the question "what is", Delphi answers the question "what can be / what should be" (Ahmadi et al., 2008, p. 177). Therefore, the method of this research is Delphi (classical Delphi) in which the initial model is examined by experts. The statistical community or participants in this part of the research are also experts who are eligible to participate in the research. The most important of these conditions: Having high level scientific and specialized information in the field of gamification - Passing or teaching specialized and professional training courses in the field of gamification and being recognized as a scientific expert - Having experience in managing gamification projects (planning , Design, implementation or control and evaluation of gamification projects) - Availability, willingness, desire and sufficient time to participate in research and transfer of scientific and experimental information in the field of gamification to the researcher - Having the communication skills needed to establish accurate scientific communication. Due to the wide range of experts in the whole country, the place of research is not limited to a specific place and the time of conducting this part of the research is the second half of 2020. Since the number of experts with the mentioned characteristics or conditions in the field of study is limited and random sampling is not practically possible, it is also the subject of specialized research and is not general, purposeful or judgmental sampling method was used. In the first stage, the researcher, while accurately and completely describing the required conditions from the experts and according to the history of his related specialized activity, judiciously selected the people who have the most important conditions. This initial list of qualified experts included 17 experts. The criterion for determining the final number of experts participating in the research process was data adequacy or theoretical saturation, so that at the beginning of the research process and in the first round of Delphi, after collecting information from 12 experts, data adequacy was obtained and theoretically saturated. The most important data collection tool was a questionnaire (in two phases or stages) that in the first round, a "structured questionnaire with open answers" questionnaire was used to identify all related topics. At this stage, the initial research model is presented to experts for further discussion and asks them questions such as the goals of a successful gamification, important tips and rules in gamification design, features of a successful and effective design and factors influencing the effectiveness of gamification, tools or methods, gamification evaluation, etc. were asked. They were also asked to submit any ideas and opinions freely. No attempt was made to evaluate or judge the opinions, and all relevant responses were collected as much as possible. After collecting the initial return questionnaires, the answers were organized, similar comments on composition, grouping and repetitive topics and margins were removed and the answers were shortened as much as possible. The experts confirmed the generalities of the initial research model and provided tips. By summarizing the opinions of experts, the final result of this stage was the approval and finalization of themes and titles, which the researcher turned into a structured questionnaire with a five-point Likert scale as the second phase Delphi tool. This questionnaire is the basis for designing the Delphi questionnaire from the second round onwards. In the second phase of Delphi (second round onwards), experts were asked to rate or quantify their agreement with each title. At the end of the questionnaire, a section was provided to insert the opinions and possible explanations of the experts about each title. After completing and collecting the questionnaires and reviewing the answers, the percentage of frequency, the percentage of agreement, the percentage of neutrality and the percentage of disagreement of the respondents to each of the questions were examined. Then the mean, standard deviation, median and t-test were calculated for each component. If the mean value is higher than the mean of 3 and the t-statistic is significant (t-statistic is greater than 1.96 ), then the component should not be omitted with 95% confidence. The results of the second round of Delphi showed that 10 components were not approved by experts and should be removed from the questionnaire. Also, according to some experts, the question "I prefer working with this gamification or using it to other similar gamifications" should be added to the questionnaire with the nature of user preference as an indicator of overall satisfaction. The Kendall coordination coefficient for the answers of this round is 0.755.

In the third round of Delphi, the results of the second stage were presented to the respondents, so that the average of the answers of the experts in the previous rounds and the answer of each person were entered separately. Experts were asked to comment on each component based on the Likert scale, according to the statistical indicators of the previous step. Based on the results of t-test, at this stage, 4 other components were not approved by experts and were removed from the questionnaire. Also, Kendall coordination coefficient for the answers of this round is 0.772, which has increased by 1.7% compared to the second round (0.755). In the fourth round of Delphi, as in the previous rounds, after collecting expert opinions, the mean, standard deviation, median and t-test were calculated for each component. In all items, the t-statistic is more than 1.96 and the average opinion of experts is four or higher. This indicates a great deal of agreement among experts. Therefore, all remaining items are approved by experts and should not be removed from the questionnaire. Kendall coordination coefficient for the answers of this round has been 0.779 which has increased by 0.7% compared to this coefficient in the second round (0.772). The results of the four Delphi rounds show that for the following reasons a consensus has been reached among the members of the working group and the courses can be repeated: First, the average opinion of the working group members is 4 and above (agreement is very high among experts). Second, Kendall's coordination coefficient for the answers of the fourth round is equal to 0.779, which has increased by only 0.7% compared to the third round (0.772) and has not grown much.

**Findings:**

Based on the four rounds performed in Delphi analysis, in the final model, the effectiveness of gamification consists of three main dimensions: user experience (consisting of 8 variables), behavioral changes and user achievements (consisting of 5 variables) and motivation (one variable). The number of items or indicators or items also decreased from the initial 76 to 63. The full results of the final round of research can be seen in Table 1 and the final model in Figure 1.

Table 1- Final results of Delphi process including variables and items of each variable

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Items** | **Average** | **Standard deviation** | **Middle** | **T Statistics** |
| Perceived ease of use | 1- I found the use of this gamification flexible. | 4.500 | 0.522 | 4.5 | 9.950 |
| 2- The user interface of this gamification was clear and understandable. | 4.583 | 0.515 | 5.0 | 10.652 |
| 3- Overall, I think it is easy to work with (or use) this gamification. | 4.667 | 0.492 | 5.0 | 11.726 |
| Consistency and user compatibility | 4- When working with gamification, I feel like I're the only one who can win this challenge. | 4.583 | 0.515 | 5.0 | 10.652 |
| 5- The subject or field of gamification corresponds to my field of activity or need. | 4.833 | 0.389 | 5.0 | 16.316 |
| 6- The skills required to work with gamification matched the skills of the user. | 4.750 | 0.452 | 5.0 | 13.404 |
| 7- Working with this gamification is in accordance with my characteristics and lifestyle. | 4.500 | 0.522 | 4.5 | 9.950 |
| User pleasure | 8- Working with this gamification takes me to another world and frees me from everything else. | 4.750 | 0.452 | 5.0 | 13.404 |
| 9- I use this gamification because of the pure pleasure it gives me. | 4.833 | 0.389 | 5.0 | 16.316 |
| 10- This gamification system helped me to have happy moments. | 4.583 | 0.515 | 5.0 | 10.652 |
| User immersion | 11- By working with this gamification, I discover things that most people do not know. | 4.417 | 0.515 | 4.0 | 9.530 |
| 12- I like working with this gamification because of the virtual explorations within it. | 4.333 | 0.778 | 4.5 | 5.933 |
| 13- When working with this gamification, I do not notice the passage of time. | 4.833 | 0.389 | 5.0 | 16.316 |
| User social and communication experiences | 14- I like using this gamification because of creating and maintaining relationships with others. | 4.583 | 0.515 | 5.0 | 10.652 |
| 15- I feel closer to groups and society with this gamification. | 4.500 | 0.522 | 4.5 | 9.950 |
| 16- In this gamification, sharing information with others is pleasant and fun. | 4.750 | 0.452 | 5.0 | 13.404 |
| 17- Because in this gamification, I feel surrounded by people who are interested or have similar experiences, I enjoy working with it. | 4.333 | 0.492 | 4.0 | 9.381 |
| 18- This gamification helps me generate good ideas and suggestions by interacting with others. | 4.667 | 0.492 | 5.0 | 11.726 |
| 19- This gamification simplifies the exchange of opinions and information with others, and I can easily interact with others in a few short steps. | 4.250 | 0.622 | 4.0 | 6.966 |
| Experiences of gamification elements | 20- The story or narration was considered desirable and reasonable for the path of gamification. | 4.583 | 0.515 | 5.0 | 10.652 |
| 21- The environment or space defined by gamification was appropriate and desirable. | 4.333 | 0.492 | 4.0 | 9.381 |
| 22- Gamification tools were interesting and attractive and I have a good feeling of interacting and working with them. | 4.500 | 0.522 | 4.5 | 9.950 |
| 23- The rules created in gamification were reasonable, appropriate, or correct. | 4.667 | 0.492 | 5.0 | 11.726 |
| 24- I have a positive opinion about the scoring and rating system defined for the user in this gamification. | 4.833 | 0.389 | 5.0 | 16.316 |
| 25- Rewards and attractive signs for the user are considered in this gamification, which motivates the user to continue working. | 4.750 | 0.452 | 5.0 | 13.404 |
| 26- This gamification is aesthetically pleasing and its components are beautiful and attractive. | 4.917 | 0.289 | 5.0 | 23.000 |
| Balance | 27- The level of simplicity and difficulty of the game was balanced and appropriate. | 4.500 | 0.522 | 4.5 | 9.950 |
| 28- The rewards offered to the user are balanced and coordinated with the level of the game. | 4.167 | 0.389 | 4.0 | 10.383 |
| 29- The progress of the steps in this gamification is balanced and the goals and steps were added to the gamification in a desirable and appropriate way. | 4.750 | 0.452 | 5.0 | 13.404 |
| Overall experiences and satisfaction | 30- This gamification helped me gain fruitful experiences and added to my previous experiences. | 4.333 | 0.492 | 4.0 | 9.381 |
| 31- This gamification helped me to enjoy my activities | 4.830 | 0.515 | 4.0 | 7.288 |
| 32- I am satisfied with working with this gamification. | 4.417 | 0.515 | 4.0 | 9.530 |
| 33- I am satisfied with the results of using this gamification. | 4.583 | 0.515 | 5.0 | 10.652 |
| 34- I prefer working with this gamification or using it to other similar gamifications. | 4.000 | 0.426 | 4.0 | 8.124 |
| Motivations | 35- When using gamification, I found it generally motivating. | 4.250 | 0.452 | 4.0 | 9.574 |
| 36- This gamification keeps me motivated to try and spend time in related matters. | 4.500 | 0.522 | 4.5 | 9.950 |
| 37- As a result of using this gamification, I feel more committed to performing my duties. | 4.167 | 0.389 | 4.0 | 10.383 |
| 38- This gamification makes things fun and enjoyable, and it motivates me. | 4.583 | 0.515 | 5.0 | 10.652 |
| Volume and variety of user exercises | 39- I feel that this gamification will lead me to practice and work more. | 4.667 | 0.492 | 5.0 | 11.726 |
| 40- The number of times and how much time I spent working with this gamification is more than previous or similar gamifications. | 4.333 | 0.651 | 4.0 | 7.910 |
| 41- The type and number of skills or topics covered by this gamification are greater than previous or similar gamifications. | 4.830 | 0.289 | 4.0 | 13.000 |
| User engagement | 42- Using this gamification system encouraged me to do things well and accurately. | 4.417 | 0.515 | 4.0 | 9.530 |
| 43- Using this gamification system encouraged me to do deep and basic things. | 4.250 | 0.452 | 4.0 | 9.574 |
| 44- This gamification system led me to find the answers to my questions and clear up my ambiguities. | 4.667 | 0.492 | 5.0 | 11.726 |
| 45- This gamification system helped me to participate actively in group activities. | 4.167 | 0.389 | 4.0 | 10.383 |
| 46- The distance between each turn of my work with gamification is short. | 4.333 | 0.492 | 4.0 | 9.381 |
| 47- I have worked with this gamification many times. | 4.583 | 0.515 | 5.0 | 10.652 |
| 48- I spend a lot of time working with gamification every time I interact with it. | 4.500 | 0.522 | 4.5 | 9.950 |
| 49- This gamification is pervasive and has involved many people. | 4.667 | 0.492 | 5.0 | 11.726 |
| 50- Gamification classification shows that the level of involvement of people in this gamification is high. | 4.167 | 0.389 | 4.0 | 10.383 |
| Attitude | 51- I think using gamification is a good idea. | 4.750 | 0.452 | 5.0 | 13.404 |
| 52- I like working with the gamification system. | 4.500 | 0.522 | 4.5 | 9.950 |
| 53- I am looking for those aspects of my work that require the use of a gamification system. | 4.667 | 0.492 | 5.0 | 11.726 |
| Perceived Usefulness | 54- Using this gamification is useful and improves my condition. | 4.500 | 0.522 | 4.5 | 9.950 |
| 55- Using this gamification increases my achievements. | 4.750 | 0.452 | 5.0 | 13.404 |
| 56- Using this gamification strengthens my desire to achieve the desired results. | 4.182 | 0.405 | 4.0 | 9.690 |
| 57- When I think of this gamification, I am reminded of its benefits and good features. | 4.417 | 0.515 | 4.0 | 9.530 |
| Efficiency and financial values | 58- Working with this gamification creates good financial value. | 4.750 | 0.452 | 5.0 | 13.404 |
| 59- Working with this gamification is an effective way to manage my time. | 4.667 | 0.492 | 5.0 | 11.726 |
| 60- Working with this gamification has made the processes easier for me. | 4.833 | 0.389 | 5.0 | 16.316 |
| 61- Using this gamification requires a minimum of time and effort. | 4.500 | 0.522 | 4.5 | 9.950 |
| 62- Using this gamification led me to buy (or repurchase) the product or service in question. | 4.250 | 0.622 | 4.0 | 6.966 |
| 63- I believe that interacting with gamification and maintaining contact with it has economic value and is useful for me in this regard. | 4.583 | 0.515 | 5.0 | 10.652 |



**Figure 1- Gamification effectiveness model including determining dimensions and variables**

So far, the first question of the research has been answered by determining the dimensions, variables and indicators of the effective gamification scheme. However, in the case of the second question of the research (ranking of dimensions and variables), in another phase beyond this research, a survey research was conducted. In that phase of the research, a real and ongoing gamification project was selected and a questionnaire in accordance with the final research model was distributed to the statistical population related to gamification. In the field of validity and reliability, Convergent validity (AVE criterion), face validity and construct validity (exploratory and confirmatory factor analysis) was measured. Cronbach's alpha method was also used to calculate the reliability, which is presented in Table 2 and the continuation of the article with a summary of the results of these calculations. All these results confirm the desired validity and reliability of the model and the questionnaire derived from it.

**Table 2 - Results of Cronbach's alpha calculation, composite reliability coefficient and convergent validity**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Cronbach's alpha** | **Composite Reliability coefficient (CR)** | **Convergent validity (AVE)** |
| Perceived ease of use | 0/802 | 0/883 | 0/716 |
| Consistency and user compatibility | 0/801 | 0/874 | 0/639 |
| User pleasure | 0/767 | 0/816 | 0/597 |
| User immersion | 0/812 | 0/889 | 0/729 |
| User social and communication experiences | 0/850 | 0/888 | 0/570 |
| Experiences of gamification elements | 0/881 | 0/908 | 0/590 |
| Balance | 0/790 | 0/834 | 0/635 |
| Overall experiences and satisfaction | 0/840 | 0/891 | 0/627 |
| Motivations | 0/910 | 0/937 | 0/788 |
| Volume and variety of user exercises | 0/708 | 0/837 | 0/633 |
| User engagement | 0/872 | 0/899 | 0/500 |
| Attitude | 0/803 | 0/886 | 0/723 |
| Perceived Usefulness | 0/885 | 0/923 | 0/751 |
| Efficiency and financial values | 0/823 | 0/865 | 0/566 |
| User Experience | 0/944 | 0/949 | 0/626 |
| Behavioral Change and User Achievement | 0/889 | 0/899 | 0/599 |
| Motivation | 0/958 | 0/961 | 0/625 |

**Discussion and conclusion:**

This study has a comprehensive overview of the issue of gamification effectiveness and by looking at the process and results of the research, it is clear that it has achieved its goal of identifying the dimensions, variables and indicators of an effective gamification scheme and ranking them. As mentioned in the background of the research, many of the previous researches are occasional or in a limited field, however, in terms of comparing the results of this research with previous researches, some can be mentioned. In Landsell & Hägglund's research (2016), the framework they provided for gamification and game-centralization includes 7 dimensions and 16 variables. Similar variables in both studies include behavioral variables, user engagement, motivation, mental state and emotions, and post-impact changes (related to behavioral achievement) and financial issues such as rewards, but variables such as key performance indicators, development and goals, type and trip of the player, feedback cycle, business core are differences, which also depends on the type of environment and research context of these researchers. In addition, motivational and value-added variables such as financial issues play an important role in their research. Also in the research of Ab.Rahman et al., (2018), the evaluation of the effectiveness of gamification in the educational system is adapted through an experimental research method and the data are based on the Technology Acceptance Model (TAM) and Student Course Interaction Questionnaire (SCEQ), collected in those four variables observed comfort, observed benefits, attitude towards gamification and the amount of user involvement with a total of 18 indicators performed, while the model of this research, in addition to including all these variables, has examined newer and more comprehensive dimensions, variables and components in a different and better way. In the present study, for the first time, the role of some factors in the effectiveness of gamification that have not been studied before (such as balance and coordination) was investigated. This factor is considered by gamification designers in the design phase and should be considered by managers, designers and evaluators. The research of Osipov et al., (2015) was conducted with the aim of developing gamification-based educational processes and proposing a general and superior educational method and by studying a specific gamification in the field of language teaching. The model and variables studied are more motivating and it is obvious that the results and model of this research are more comprehensive and complete. Our research emphasizes that the key to having effective gamification in various functions is to understand and pay attention to the dimensions and variables of this model and should be evaluated in different stages of managing a gamification plan (such as planning, design, control and monitoring, evaluation), all components of the model should be carefully considered. If we consider the gamification process in three stages including before starting, time of use and also after interacting with gamification, it becomes clear that the model of this research is user-oriented instead of focusing on the game itself. This model focuses on the user from the initial stages (user motivation and experience related to the time of interaction with gamification) to the final stages of the gamification process (gamification output including behavioral changes and gamification achievements for the user) and this is one of the pure advantages of this model.

The results and dimensions of the research model provide important and significant suggestions for gamification designers, planners and evaluators who are somehow involved in the gamification management process. In the case of "user behavioral and achievement changes", which is a very important dimension, tactics should be such that the use of gamification is beneficial for the user, and in the next step, it is necessary to seek to strengthen the user's behavioral changes. If gamification engages the user well, the user finds interaction with gamification useful and beneficial, or gamification has efficiency and financial and economic achievements for the user, improves the amount and type of skills and creates a positive attitude in him, in If there is a previous negative attitude, correct it or eliminate it, or at least do not create a new negative attitude, it can be said that it has created behavioral changes and desirable achievements for the user. The easier the user is to use or interact with gamification and the less difficult it feels, the more effective gamification will be. In the gamification design and planning stage, it is necessary to pay special attention to the balance in the difficulty of the game, the balance in the reward and the balance in the stages and the progress of the game in order to increase the effectiveness of the gamification. Gamification should be designed and implemented in accordance with the conditions and needs of users, and before that, the needs assessment and correct knowledge of the audience should be done. Regarding user motivation, it is necessary to maintain the necessary measures for the useful and effective presence of the audience in the gamification process within the flow in all stages of gamification (from the beginning and beginning of the interaction to the successful and complete process).

Regarding the suggestions of future researches, in the next researches, the role of each dimension in the effectiveness of gamification can be examined in a specific and detailed way or the indicators can be developed. Topics such as proposing executive solutions to improve the effectiveness of gamification, how users relate to the features of gamification and their views, etc. are other suggestions for future research that are very necessary. Every research has limitations and during the research, problems arise that the researcher did not anticipate or could not address. Limitations such as low or limited records of the research subject, especially in domestic research, limited facilities and time, scope of the subject and applications of gamification, and consequently diverse and heterogeneous experiences and views of experts on the subject of gamification and difficulty focusing on the effectiveness of gamification and ... have been one of the most important limitations of this research.

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