Research Article

Interactive e-Contents: A Novel Gamification Approach for Students' Satisfaction

Saeed Rouhani[1], **Mehran Rezvani**[2]

1. IT Management Department, Faculty of Management, University of Tehran, Iran, Islamic Republic of; 2. University of Tehran, Iran, Islamic Republic of

The purpose of this study was to identify different ways of interaction through content and to measure the impact of this content on students' satisfaction with learning. Hence, various types of interactive contents and their presentation were studied, the interactive content based on the game was selected from among them, and one sample was produced and evaluated at the University of Mehr Alborz. The research method in the stage of production of sample content was experimental and prototyping, and descriptive-applied at the evaluation stage. The population of the study was the students of the University of Mehr Alborz studying in the first semester of the academic year 2020-2021, the sampling was convenience random method, and the number of members in the population was 35. Data collection was done though a questionnaire whose reliability was 0.834 using Cronbach's alpha coefficient, and its validity was confirmed by content and face validity. Data analysis was performed with the help of SPSS23 considering mean, percentage, standard deviation and Kolmogorov-Smirnov tests, binomial, Mann-Whitney, Kruskal-Wallis, and Pearson correlation coefficient. The findings of this study showed that more than 80% of students approved the simplicity and usefulness of the interactive game content and were generally satisfied with its use. More than 70% confirmed the existence of constructive interaction in this type of content. According to the results of this research, gamification can be used as an effective way to improve the learning process and increase students' satisfaction with learning in e learning courses.

Corresponding authors: Saeed Rouhani, SRouhani@ut.ac.ir; Mehran Rezvani, m.rezvani@ut.ac.ir

1. Introduction

Computer-based education and the production of electronic content have been evolving more in the last two decades as one aspect of e learning [1]. Two areas have played a significant role in the formation of electronic contents: software manufacturing companies (technical sector developer) and educational institutions such as university laboratories, institutes, and research centers that have studied and researched the pedagogical aspect of electronic content.

The common feature of most of these approaches is the focus on the active role of the learner, student-orientation, genuine and real assignments, situational learning, and high-level cognitive skills, which should be considered in the design of electronic content. The electronic content should be designed to assure students that they are not merely passive spectators in the education process but actively engaged in it. The meaning of the learner's engagement and the interactive content of electronic content is that students engage in a two-way flow of education and engage in an activity, solve a problem or evaluate, and so called, be mentally engaged with the content (as it happens in face to face learning) [2].

In this research, we seek to answer the following questions:

1. What are the different types of interactive content models?
2. Which interaction criteria in interactive content production can have a positive effect on students' satisfaction?
3. Can the use of gamification, as one of the methods for producing interactive content, affect students' satisfaction with learning?
4. What are the models for assessing interactive content in e learning and what are their requirements?

The types of interaction in e learning courses and the role of content in it, the process of learning e learning and its move towards informal education system, content types and an introduction to gamification as contents with high interactivity, previous research in this regard, research method and evaluation model, the discussion and comparison of the results of the research with other research and the expression of overall results will be discussed.

Interaction can be explained in terms of the factors involved. Michael Moore is the first one to discuss the most common form of three-way interaction in distance education: student-student, student-teacher,

and student content [3]. Anderson Grayson (1998) expanded the list [4] to include teacher-teacher, teacher-content, and content-content interactions. Figure 1 shows six types of educational interactions.

A great part of students' time in all types of education is spent on interaction with educational content. In traditional and classroom-based education, this means reading texts and library resources, but in electronic content structures, content often comes with a rich set of computer-based tutorials, simulations, virtual labs, and creative presentation tools. However, the work done in developing, indexing and distributing such content often referred to as "Learning Objects" has created the hope that professors and students will be able to access a wide variety of contents [5].

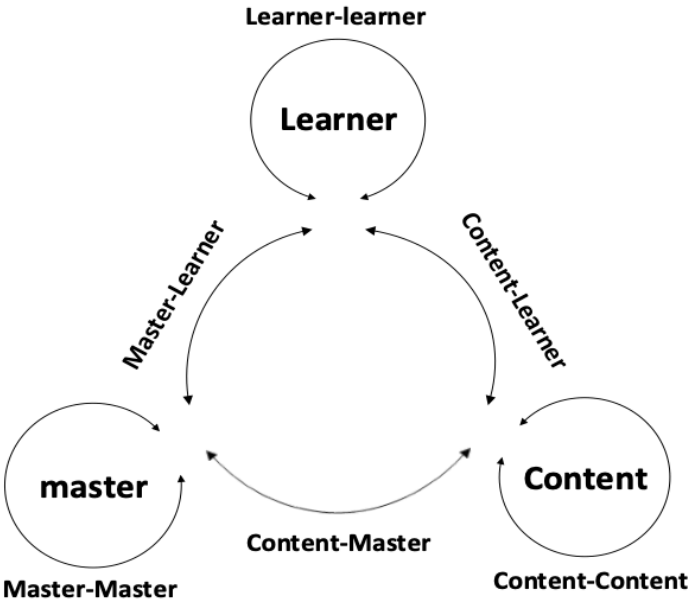

Figure 1. Educational interactions

In the past, it was assumed that content have a static and inactive state, and students should absorb and digest it, but now, it is possible to give a dramatic mode to the content and plan it as human beings autonomously with will and rationality, which can play a more active role in student-content interactions [5].

Today, in advanced societies, formal education system does not meet the educational needs of individuals and uses non-formal and informal systems to cover these needs. The term non-formal education was formed in 1968 [6] when there was a widespread belief in the dissolution of the formal education system [7] [8], and not only in advanced countries, but also in developing countries, it was considered as a

panacea for the sick educational systems of the societies [8]. Formal education is “A codified, ranked, and hierarchical educational system structured in sequence, which is structured in the range from elementary education at low and university education at high levels” [9]. On the other side, non-formal education is any educational activity out of the formal education system, and according to the definition, it is “Any systematic and organized educational activity outside the formal framework for learning different subjects in different age groups from children to adults” [10].

There is a third notion in education known as informal learning. It is a lifelong process through which each person acquires knowledge, experiences, attitudes, and insights from everyday experiences and the discovery and understanding of the environment at home, at work, in the game, and from family and friends′ behaviors when traveling, read books, and newspapers, or by listening to the radio and watching films and television. In general, personal learning is unorganized and non-systematic [10].

Epignosis Institute [11], one of the institutes active in e learning, in a book entitled *E Learning for Concepts, Processes and Applications* describes the e learning process:

Type	Description
Blended Learning	This is a combination of offline (face-to-face and traditional learning) and online learning, so that one is complementary to the other. This type of learning provides a platform for people making learning more and more enjoyable from both types of learning. For example, students may attend the classroom in person and then submit the curriculum by completing online multimedia tutorials delivered by their respective professors.
Participatory and social learning	This is an approach of e learning through which students can socially interact with other students as well as their teachers. Generally, students work together to develop their knowledge of specific skills or subjects. This collaboration in the e learning environment is usually done through online conversations, message pages, or instant messaging.
Gamification	Using game-based stimuli for aesthetics and game-like thinking is to get people involved, motivate work, increase learning and solve problems. Learning through gamification is essentially the use of game technology to solve problems outside the game context. The games are designed to involve, amuse, and entertain people. Gamification is something more than awarding prizes, points and medals in order to motivate people
Micro Learning	This is a phrase widely used recently, especially in e learning environment. This educational approach can provide widespread benefits to all educational stakeholders such as students / staff as well as employers / professors. The main reason is that micro learning can provide the same knowledge and skills obtained from online education without putting pressure on learners. Micro learning is quickly becoming the fastest growing electronic learning trend.
Video learning	Faster internet communications and increase in the use of mobile phones and tablets with video capabilities mean that the use of video in e learning process is very prevalent.
Fast electronic learning	This refers to faster process of designing and developing online learning courses. Instead of spending months or even years on developing a training course, fast e learning allows creative people to develop lessons or syllabuses within a few days or weeks. This is usually done through PowerPoint or descriptive videos designed to provide students with quick and easy information. Then software is used to test students. This software also provides students with exercises that can be done singly and through pre-recorded videos and presentations.

Type	Description
Personalization and e-learning	Personalized learning is in fact the organization of learning, curriculum and learning environments to meet the needs and match the learning style of learners. “Personalization” is more than “individualization” or “differentiation” because it allows the learner to choose the subject of instruction, time, and the quality of learning.
Continuous learning	At the personal level, it is about continuously increasing the skills and skill sets through learning and raising knowledge. By changing life, the need for professional and personal adaptation is as real as possible.

Table 1. E learning process

According to the above table, content plays a key role in all types of e learning methods.

Content of a curriculum is organized and accumulated knowledge, terms, information, facts, realities, rules, principles, methods, concepts, generalizations, phenomena, and issues related to the same subject [12]. Non-electronic content mainly consists of text and still images printed on paper, but electronic content is a collection of texts, images, audio or multimedia combinations offered as personal, mobile, and web-based technology and the goal is to help learners for interactive, personal, and flexible learning.

Contents are mainly divided into three categories based on uniqueness, structure, and interaction. Several factors fall under each of these categories [13].

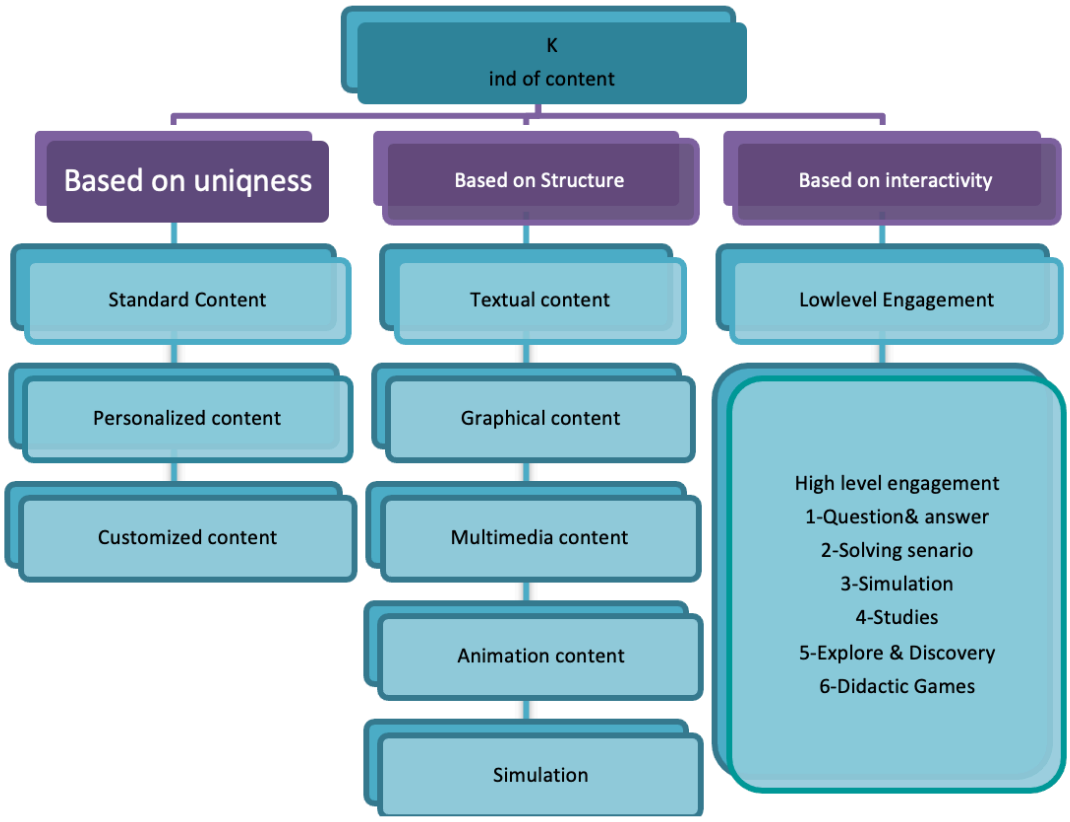

Figure 2. Types of content

In this research, the focus is on educational content with high interaction, and this kind of content used for the case study is educational gamification process. We will provide a brief definition of gamification and related concepts.

Several definitions have been proposed for gamification, the most common of which is the application of game mechanics to activities other than games in order to influence the behavior of individuals [14]. Moreover, Gabb Zikerman defines gamification as the application of game thinking and game stimuli for audience participation and problem solving. The key to these definitions is that gamification is essentially the use of game elements designed to be used in a non-game context, which is exactly the element distinguishing it from real games designed for fun interactions [15].

Gartner Institute (2011) predicted that in next 10 years gamification would be one of the key trends for businesses, IT planners, and large organizations.

The game mechanics are the basis of the rules and techniques used when playing games as the building blocks of gamification of a website or software [14]. By using them jointly or separately, one can create a user with high motivation [16]. These stimuli include:

Title	Description
Points	Using scores, one can give points to users in a variety of ways and different score points can be used or lead people to different behaviors on the site or software (Bunch Ball Institute, 2010). Typical types of privileges are experiential privileges (XP), skill privileges (ratings, scoring) and influential privileges (reputation, ranking) [17].
Steps	The stages include a system or a ladder that are awarded to players by virtue of increasing their credit through gaining privileges. When the players pass to higher stages, the attributes or abilities are awarded to them. Staging is one of the main components for motivating players. Usually there are three staging staircases: simple and uniform, explanatory and waveform performance [16].
Challenges, Awards, Medals, Success	These four stimuli act in the same way, and in effect, give the people the mission to complete it and then award it to the people to complete it. Challenges show people goals and give them the feeling they are trying to do. The general purpose is to configure the challenges based on the actions that people are pursuing and upon achieving these goals, they are awarded awards, medals or rewards. Medals, cups, privileges, etc. are a clear feature that demonstrates the achievement of new stages or the completion of challenges [16].
Leaderboards	The majority of successful games have used cleverly the high score table. They bring about reputation with them and the player's name shines. In addition, these tables show what performance a person has in relation to his friends and other people. The pioneering ones presence in the field of gamification uses competition in order to push on valuable behaviors, pursues and displays the desired actions [16].

Table 2. Mechanics of game

In addition to the concept of game mechanics, there is another notion known as game dynamics: game dynamics are the reasons why people are motivated by game mechanics.

People have desires and needs that are the same across generations, ethnicities, cultures, and gender around the world. Game designers know how to meet these needs in game environments, and the increasing need to please oneself make these rules widely used [16]. Some of the obvious motivations and needs are:

Reward, status, progress, self-expression, competition, and altruism

The following figure shows the relationship between mechanics and game dynamics:

Game dynamics	Game mechanics					
	Bonuses	Status	Progress	Self-expression	Competition	Altruism
Points	•	•	•		•	•
Steps		•	•		•	
Challenges	•	•	•	•	•	•
Virtual goods	•	•	•	•	•	
Leaderboards		•	•		•	•
Giving gifts		•	•		•	•

Table 3. The Relationship between Mechanics and Dynamics of Games

Under MDA (abbreviation for mechanics, dynamics and aesthetics) framework, another game technique that guides and motivates players is the game's aesthetics. The aesthetics of the game is favorable emotional reactions that are made to the person during the interaction with the game [18]. Therefore,

games can stimulate the performance and engagement by stimulating emotions such as laughter, trust, surprise and satisfaction in the user.

When talking about gamification in education, we mean something beyond the simple application of video games and educational games for learning purposes. The application of gamification in education implies the application of game components in a way that motivates students to learn, experience, and gain skills [19]. Unfortunately, education in its current situation is a bad example of play, meaning that there is a bad example of gamification, which means that there is a specific type of game components such as privileges and rankings, but so far they have not succeeded making students act [19] [20].

The general belief is that the scoring of a game mechanics is expired [21]. The scoring system that is used today is not motivating, so education does not achieve its goals (Jay Lee, Hummer, 2011). The problem with the current rating system is that when you fail, overcoming and participating in that lesson is difficult or almost impossible. As a result, students lose their motivation and interest.

The most important difference between the scoring system and bonus-score is that the second type does not emphasize the final scores, but small positive actions such as attending classes or completing assignments are more important [21]. In total, gamification states that you do not lose, you just do not get many points. Learning methods should be looked at from another angle to address this problem. In the practices, strategies and actions required, external factors should be used that go beyond university constraints.

An important part is that students should always know what they would receive to complete each assignment, so students know how much they need to study in order to succeed [22]. During the school year, each student knows what privileges he has and if he is not satisfied, he should act more to gain more points without teacher's guidance. Therefore, the teacher is responsible for the process of the game, which depends on the ranking, understanding skills and general level of his student's education [23].

In his paper, Kiili (2006) [24] presents an empirical gamification model and explains how game design process can have a role in and affect the learning process.

Kiili's model is based on Mihaly Csikszentmihalyi's case, suggests that in an optimal experience, a person is in such a psychological state, and is so focused on the activity of reaching the goal of his that nothing else matters to him. Based on this model, learning is

based on a cyclic process through direct experience in the game world and the required learning activities are both cognitive and behavioral.

This template contains a solution loop, an experiment loop and a challenge tank. The motivations and activities of the player represent the depth of the model, which together with the social and individual parameters cause the player to reach the solution. After this stage, solutions are examined in the loop of experience, where players have the ability to control the game, develop their knowledge of the subject matter, and ultimately optimize the strategy of the game. Another important point is that the speed of the challenges is in accordance with the characteristics of the player to increase the impact on him.

In another paper, Fong-Ling Fu et al. (2009) [25] argued that in an effective e learning game, the enjoyment of the learner acts as a catalyst for encouraging him to take the initiative in the learning process; therefore, the availability of a measure that effectively measures the enjoyment of games provided by e learning helps better game design. For this purpose, an eight-dimensional scale has been used to measure learning flow: immersion, social interaction, challenge, goal clarity, feedback, concentration, control and improvement. This scale measured four learning games used in the online education of universities, and the results showed that the validity and reliability of the scale used were satisfactory.

2. Method

In summary, the model of this research is inspired by Kiili's empirical model of gamification, and in terms of the technical content, it is structured using a commercial software program under the survey of the educational environment of the Mehr Alborz Institute of Higher Education. Figure 4 shows the systemic model of this research.

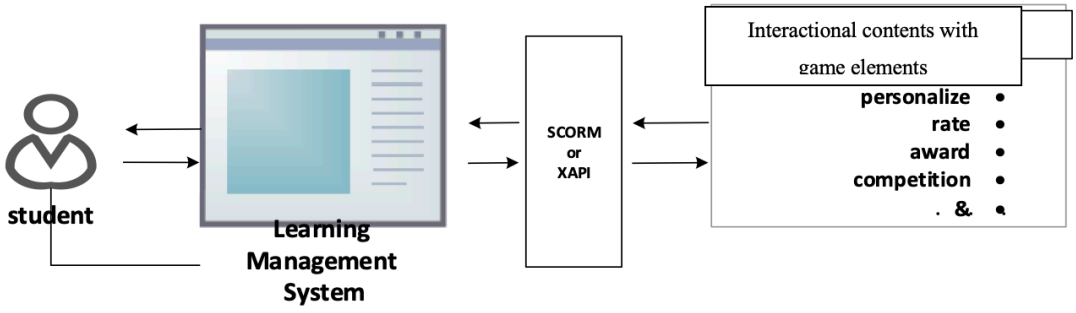

Figure 4. Systemic Model of the Research

doi.org/10.32388/PEYELX

In order to evaluate the efficiency of the game designed and to examine students' views, some of the proposed models in this regard were examined. Among the most important ones, the model of the acceptance of the learning system by Moodle (Sánchez & Hueros, 2010) [26], Technology Acceptance Model [Holden & Karsh, 2010) [27], Technology Acceptance Model 2 [27], Expectation model of information technology (Hong, Thong, & Tam, 2006) [28], Extended IT Expectation-Confirmation Model [28], and Kiili's model (2006) [24] can be cited. Extended IT Expectation-Confirmation Model is the basic model of this research is to evaluate the designed game. This model is a combination of IT Expectation-Confirmation Model and Technology Acceptance Model (TAM). Since the models mentioned are designed to illustrate different aspects of user perception, there are similarities between these two structures. For example, in both models, the perceptual usefulness variable is available. In TAM, the principle that has an attitudinal structure is perceptual usefulness as the prerequisite of attitude and intent in the application of the given technology.

In IT Expectation-Confirmation Model, as outlined in Figure 12, perceived usefulness (expectation after acceptance) is a prerequisite for satisfaction in the use of IT and the intention of the continued use of IT. In fact, the intentions of use and continuity of the use of IT are the same structures that can be measured at different points in time. As a result, TAM and IT Expectation-Confirmation Model are conceptually similar in nature, and these similarities have led to the mixing of these two models and the creation of a hybrid model.

In addition, in Kiili's model, there is a concept called flow experience that expresses the attraction or complete involvement in an activity and refers to the desired experience [29][30]. During the optimal experience, the individual is in a particular mental state and is so immersed in the purposeful activity that does not pay attention to anything else. According to Mihaly Csikszentmihalyi's definition (1991) [29], the phenomenon of flow status has nine dimensions. The first five dimensions are the introduction of the flow and the others are indicators of the creation of flow experience [24].

These nine dimensions include 1) challenge-skill balance, 2) action-awareness merging, 3) activity goals, 4) clear feedback, 5) control, 6) focus, 7) loss of self-consciousness, 8) transformation of time concept, and 9) autotelic experience, among which the following four were considered for the evaluation model:

1. challenge-skill balance: while experiencing the flow, the person sees the challenges in the activity appropriate to his skills, both of which act at their highest level [31]. In other words, the skill of the person is at the level that adapts to situational needs.

2. Activity goals: the goals must be defined clearly to achieve the desired flow [32]. Although the goals of some activities are not always clear, such as creative activities, a person can develop a strong emotion about what he intends to do.
3. Clear feedback: clear feedback is relevant to the goal dimension, because it enables the person to be informed about how he is performing a specific activity. By dividing the main objective into several subfields, the logical feedback system can be developed more easily [24].
4. Control: The person experiences the concept of control without using the action. According to Mihaly Csikszentmihalyi, this is more about the concept of the possibility of control rather than real control. When a person finds out that he is able to increase his skills to the extent that the error rate reaches zero, he will enjoy a satisfying experience. Ghani and Deshpande (1994) [30] consider this concept of control as one of the most important preconditions for the flow of games.

Regarding the subject matter of the research, and examining the variables in other models, especially Kiili's model, and according to the experts, the variables available in most models with a high score are used to evaluate in this study. Therefore, the custom model of this study is in Figure 5.

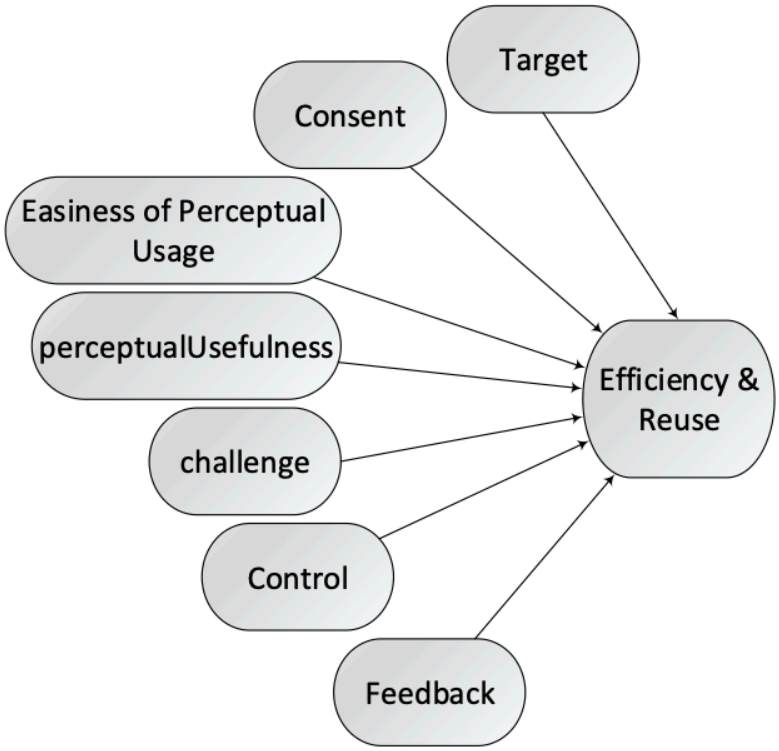

Figure 5. Research Assessment Model

The content scenario involves the training computer networks using question and answer, and is designed in a game-like frame. In general, in this instance of game, mechanics including points, steps, challenges and leaderboards, as well as game dynamics such as bonuses, status, competition, and self-expression are used. Moreover, the sample produced is compatible with the standards SCORM and the Tin Can API. The research method was experimental and prototyping, descriptive-applied at the second stage, and the place of research was Mehr Alborz institute of virtual higher education. The number of participants in this study, all of whom was the students of this university, was 35. Data is collected through questionnaires.

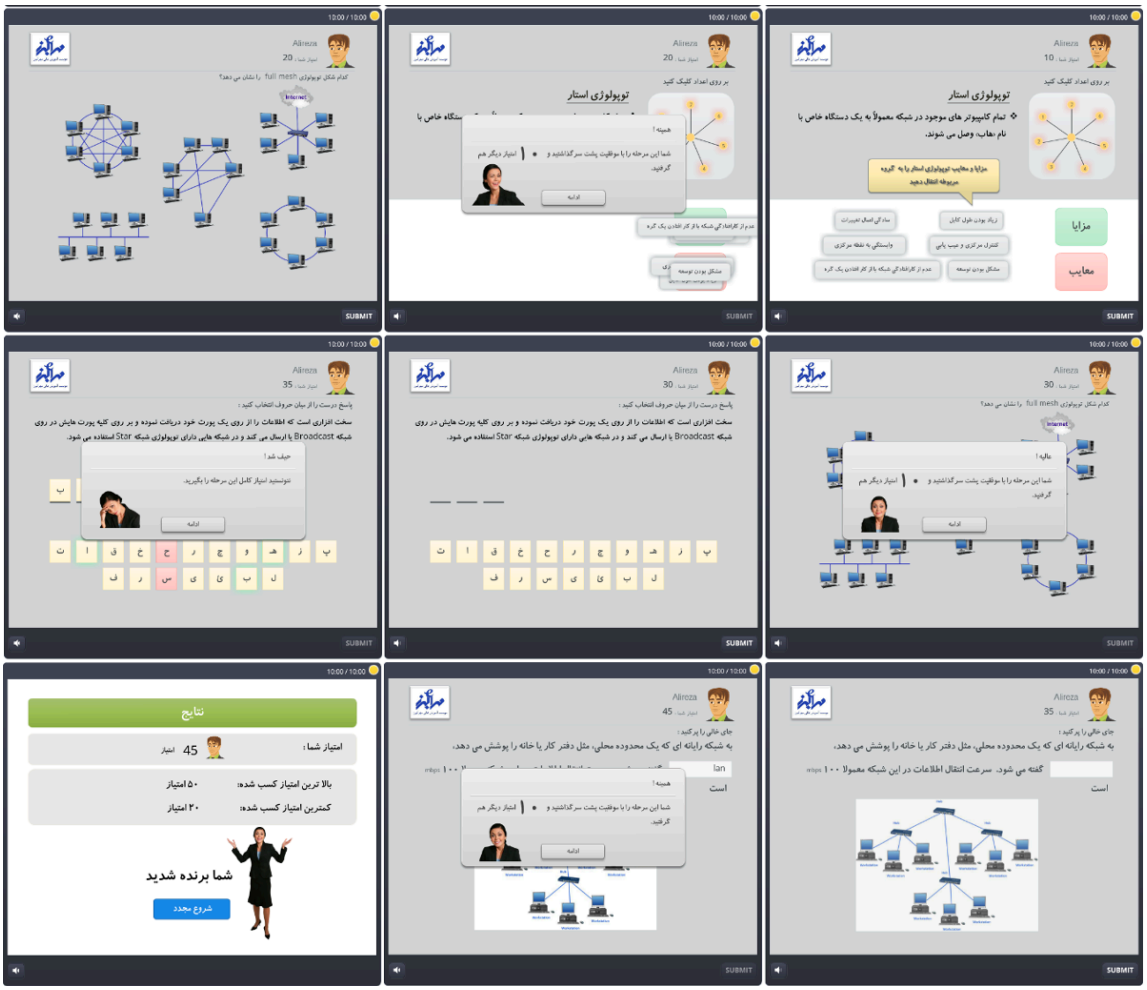

Figure 6. Pictures of the Designed Sample

Since the main tool in this research was a questionnaire, the questions had been extracted from valid scientific papers, and the validity in the main questionnaire was measured in English, the researcher had an easy task in instrument validity. At the same time, in order to ensure the reliability of the measurement tool, for measuring the face and external validity, as well as the removal of the translation effects and underlying variables, interview, consultation with the supervisor and advisor and their approval, as well as expert opinion were used. The questionnaire was translated from Persian into English and the differences were reviewed and corrected.

The reliability test of the questionnaire was carried out for 7 variables and 17 questions, which can be seen in the table below. As is seen, Cronbach's alpha value for all variables is greater than the acceptable limit (0.7) for applied purposes.

doi.org/10.32388/PEYELX

Variable	Questions	The frequency of questions	Alpha value
Perceived usefulness (PU)	1-4-12	3	0.860
Perceived ease-of-use (PEOU)	2-10-14	3	0.806
User satisfaction	6-8-16	3	0.803
Challenge	3-15	2	0.772
Control	5-11	2	0.731
Feedback	7-13	2	0.744
Goal	9-17	2	0.760
All questions	1 to 17	17	0.834

Table 4. Values of Cronbach's alpha

3. Findings

After collecting the questionnaires and scoring them, all data was analyzed using descriptive and inferential statistical, and data was analyzed using SPSS 23.

doi.org/10.32388/PEYELX

Variable	Frequency	Mean	Median	Standard deviation	Minimum value	maximum value
Perceived usefulness (PU)	35	4.1429	4.3333	0.83347	2	5
Perceived ease-of-use (PEOU)	35	4.1429	4.3333	0.73780	2.33	5
User satisfaction	35	4.1048	4.3333	0.83538	2	5
Challenge	35	3.7	4	0.89278	1.5	5
Control	35	4	4	0.79521	2.5	5
Feedback	35	3.8429	4	0.92173	1.50	5
Goal	35	3.9429	4	0.83817	1.50	5

Table 5. Descriptive statistics of variables

Examining the normality of variables by Kolmogorov-Smirnov test showed that the significance level of all variables was less than 0.05 and the assumption of the normality of the observations (zero assumption) was rejected, so nonparametric methods such as binomial test were used to analyze observations.

In this study, a five-option Likert was used as follows, and for this reason, to examine the success rate and the existence of a variable in the population, the median of this spectrum, 3, was considered. Therefore, values greater than 3 are considered as success and values smaller than and equal to 3 are interpreted as failure. In general, the binomial test hypothesis is as follows:

$$\begin{cases} H_0 : p = p_0 \\ H_1 : p \neq p_0 \end{cases}$$

Since in this research we sought to prove the correctness of the hypotheses and not the equality or inequality of the two values, the hypothesis of the test was considered as follows:

$$\begin{cases} H_0 : p = 0.60 \\ H_1 : p \neq 0.60 \end{cases}$$

doi.org/10.32388/PEYELX

Given that the questionnaire questions, each of which somehow measure one of the variables PU, PEOU, user satisfaction, challenge, control, feedback, and goal, and taking into account the equal weight for each question, the mean value of the scores was used to test the variables.

Variable	Groups		Frequency	Ratio observed	Test ratio	Significance level (decision criterion)
PU	First	3 ≥	4	0.1	0.60	0.000
	Second	3<	31	0.9		
PEOU	First	3 ≥	5	0.1	0.60	0.000
	Second	3<	30	0.9		
User satisfaction	First	3 ≥	4	0.1	0.60	0.000
	Second	3<	31	0.9		
Challenge	First	3 ≥	10	0.3	0.60	0.000
	Second	3<	25	0.7		
Control	First	3 ≥	6	0.2	0.60	0.000
	Second	3<	29	0.8		
Feedback	First	3 ≥	8	0.2	0.60	0.000
	Second	3<	27	0.8		
Goal	First	3 ≥	5	0.1	0.60	0.000
	Second	3<	30	0.9		
total			35	0.00		

Table 5. Statistical data of the hypotheses

As seen in the table above, the significance level for all variables is less than 0.05, which indicates that the null hypothesis is rejected (equal to the mean value).

The observed ratio for the second group (3<) in PU is 0.9, so it can be concluded that users have given a score higher than average to this variable. In other words, the users have assessed using interactive content with game elements as useful.

The observed ratio for the second group (3<) in PEOU is 0.9, so it can be concluded that users have given a score higher than average to this variable. In other words, the users have assessed using interactive content with game elements as useful.

The observed ratio for the second group (3<) in user satisfaction is 0.9, so it can be concluded that users have given a score higher than average to this variable. In other words, the users have been satisfied with using interactive content with game elements.

The observed ratio for the second group (3<) in challenge is 0.7, so it can be concluded that users have given a score higher than average to this variable. In other words, while using interactive content with game elements, the users have confirmed the existence of a challenge appropriate to their skill.The observed ratio for the second group (3<) in control is 0.8, so it can be concluded that users have given a score higher than average to this variable. In other words, the users think that using interactive content with game elements increases their control over their learning process. The observed ratio for the second group (3<) in feedback is 0.8, so it can be concluded that users have given a score higher than average to this variable. In other words, the users have confirmed the existence of appropriate feedback in interactive content with game elements. The observed ratio for the second group (3<) in goal is 0.9, so it can be concluded that users have given a score higher than average to this variable. In other words, the goals of interactive content with game elements are clear to the users.

In addition, the results of Mann Whitney U and Kruskal Wallis tests for gender, field of study, and age group showed that these indices do not affect the variables of research.

Pearson correlation test was used to examine the correlation between variables, whose results are as follows:

- *There is a positive relationship between PU, challenge, control, and goal.*
- *There is a positive relationship between PEOU, user satisfaction, challenge, feedback, and goal.*
- *There is a positive relationship between user satisfaction, PEOU and control.*
- *There is a positive relationship between challenge, PU, PEOU, control, and goal.*
- *There is a positive relationship between control, PU, user satisfaction, challenge, feedback, and goal.*
- *There is a positive relationship between feedback, PEOU, the control, and goal.*

- *There is a positive relationship between goal, PU, PEOU, perception, challenge, control, and feedback.*

Comparing the results with other research results is as follows:

The results of Glover (2013) [33] show that gamification is a concept that can make learning more attractive, but it should not be conceived without concepts or other methods, and to create a good learning experience in the learner, the type of content and what is useful for the learner should be considered. Moreover, the results of the study by Muntean (2011) [34] show that by providing appropriate feedback to students, gamification helps motivate learning more and encourage the students to study further. These issues were also evident in the current research results, and the findings showed that if a proper scenario is designed to provide content using game elements and appropriate feedback regarding student performance, students would be more inclined to use this kind of content.

In addition, comparisons of the studies with quantitative results with the results of the current research indicate the desired status of the variables:

Researchers	Sample game	Model of measurement	Challenge	Control	Feedback	Goa l
Rouhani, S., Mardani, A.R., Ebadi, R.	Computer Networks	Extended IT Expectation-Confirmation Model and Kiili's Model	3.7	4	3.8429	3.9429
Kristian Kiili	Game1	Kiili's Model	3.96	3.645	4.03	4.26
Fang Ling Fu, Rang-Cheng Su, Sheng-Chi Yo	Game1	EGameFlow	4.654	4.686	4.890	4.180
	Game2		4.880	4.880	4.950	5.360
	Game3		5.019	5.019	5.230	5.048
	Game4		4.7638	4.764	5.149	5.306

Table 6. Comparison of the studies

A summary of the results of the data analysis is summarized in the following figure. As can be seen, the mean scores earned by all variables are greater than 3.7, in other words, more than 70%.

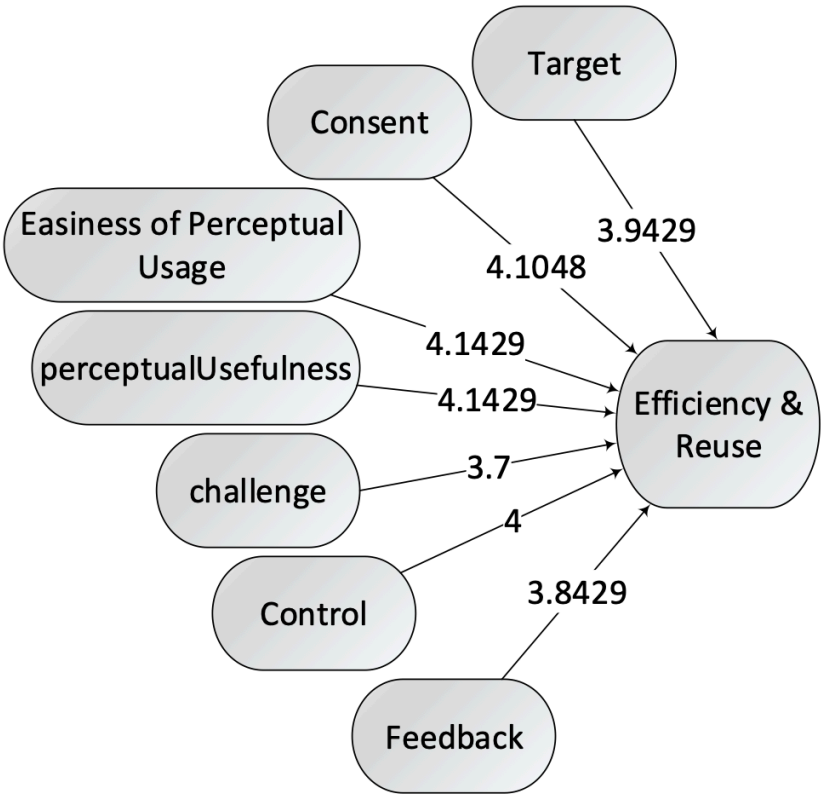

Figure 7. Resulted Model

4. Discission

Limitations of the study

- Not completing questionnaires where even the name of the respondent is not mentioned in accordance with scientific and ethical principles is a problem that has been encountered by researchers. In this regard, this problem had a new state in the study because the students were required to work with the content for some minutes and then complete the questionnaire about its performance.
- The novelty of the field of research in e learning and the lack of a similar sample in higher education has caused some students not to understand the content designed with the game elements and to criticize this type of content in supplementary comments.
- Lack of access to technical information of the external practical examples for evaluating or gaining experience for the researcher was one of the biggest problems of the research.

- The content designed was a module completely independent of university and student information and was based solely on the content previously provided at the university. Due to the applied nature of the research and the need for the production of a prototype, it was more preferable that the relationship between content and student information be examined through standard APIs, so that through student activity, his learning processes can be tracked through the learning management system.

Since the most important factor in designing the content with game elements is the game scenario, to design of the content of the sample, its corresponding scenario had to be designed, and this required a thorough understanding of the content as well as the viewing similar scenarios in the context of the content. For this reason, various samples were examined, but some samples were commercial and large amounts of money had to be paid for observing them, which made examining these samples impossible, so the quality of the sample content could have been better than what was designed.

Suggestions

- Designing different scenarios for education using gamification in the production and presentation of content can be a long-term program in e learning courses.
- Game elements can also be used in learning management system of the virtual universities and the student learning process can begin with a game scenario, a part of which is interactive contents. For example, in the student profile section, depending on the quality of the work of the students in different parts, one can use different titles such as golden student, silver, etc. Moreover, this information can be sent to the contents and the degree of difficulty can be changed with respect to this information.
- To create charm in the game, one can use different characters with different states (excitement, joy, sadness, etc.).
- To create more challenge, different methods can be used, including the use of smart content: the content that can change feedback itself based on user performance and thus challenge the user.
- To increase the control over the learning process, it is possible to add features such as presenting different reports in interactive content.
- Using appropriate feedback, one can be enhance content appeal. For this reason, it is suggested that various ways of providing feedback in interactive content be investigated in future research.

5. Conclusion

To do this research, we first studied the process of e learning and content types. Accordingly, it became clear that new methods are currently being used in the world to provide content, of which the most important ones are collaborative, social and gamification learning. In addition, due to the high interactivity of gamification content, this type of content was selected for survey in the e learning course. Then we discussed the concepts of gamification, the various ways in which game elements are used in content creation, and some contents were designed that contained game mechanics including points, steps, challenges, and leaderboards as well as game dynamics such as bonus, status, competition and self-expression. This content was provided to students for one month at a virtual university. Moreover, along with the production of interactive content samples, a questionnaire with 17 questions was designed by examining the studies conducted in the field of the use of gamification in e learning as well as the intention to continue using content, and tried to identify the most important factors affecting this topic. To be placed. After working with the contents, the users completed the electronic questionnaire and after the specified period, the responses of the questionnaires were evaluated.

The findings of this study showed that more than 80 percent of students evaluated the use of interactive content with game elements, simple and useful, and are generally satisfied with the use of it. Furthermore, while using this type of content, more than 70 percent of students confirmed the proportion between their skills and the content challenge, their increased control over the learning process, the availability of appropriate feedback on content, and clear goals of content, all of which are signs of constructive interaction in the content. For this reason, using this type of content in e learning courses is recommended. Nevertheless, the most important limitation in the implementation of this research was the difficulty of designing different game scenarios for delivering content in the form of gamification. In this regard, it is suggested that institutions and universities offering e learning courses research on the quality of designing and use different game scenarios to provide interactive content to increase the quality of gamification content. In addition, according to the results of this research, gamification can be used in electronic learning management systems (LMS), in which case the content appeal would increase bringing about the increase in the motivation of students and their performance.

References

1. ^Harvey, J. (1995). “The market for educational software.” Critical Technologies Institut- RAND, prepared fo r Office of Educational Technology, U.S.Department of Education. DRU- 1 04 - CTI.
2. ^Rezaei, A., Nasri, Sh. (2012). A model for designing interactive electronic content and educational simulati ons. Roshd Magazine Tehran. No. 3. Volume 28. 20-23
3. ^Moore, M. (1989). Three types of interaction. American Journal of Distance Education, 3(2), 1-6.
4. ^Anderson, T., &Garrison, D. R. (1998). Learning in a networked world: New roles and responsibilities. In C. Gibson (Ed.), Distance learners in higher education (pp. 97-112). Madison, WI: Atwood Publishing.
5. a, bGrayson D. R., Anderson. T. (2003). Electronic Learning in the 21st Century Theoretical and Practical Fou ndations. Translated: Ismail Zarei Zawarki and Saeed Sefaii Movahed (2005), Tehran: Publication of Scienc e and Technology
6. ^Coombs, P. H., World Educational Crisis: A Systems Approach, New York: Oxford University Press, 1968.
7. ^Illich, I., Deschooling Society, Calder and Boyars, London, 1971.
8. a, bFreire, P., Pedagogy of the Oppressed, Harmonds Worth, Penguin, 1972.
9. ^Demirel, M., Lifelong Learning and Schools in the Twenty-first Century, Procedia Social and Behavioral Sc iences, 1, pp. 1709–1716, World Conference on Educational Sciences, 2009.
10. a, bCoombs, P. H. and M. Ahmed, Attacking Rural Poverty: How Non-formal Education Can Help, Baltimore, John Hopkins University Press, 1974.
11. ^E learning Concepts, Trends, Application V 1.1 - January 2014, Epignosis LLC, EBook, retrieved 02-05-2015, www.talentlms.com/elearning/elearning-101-jan2014-v1.1.pdf
12. ^Fathi Vajargah, K. (2009). Principles and Programming Curriculum Writing by Dr. Ball Publishing, Tehran
13. ^5learn SBU, "Types of Content" Retrieved July 25, 2015 from http://5learn.co/types-content
14. a, bGamification Encyclopedia, Retrieved June 2015 from corporate wiki: http://gamification.org/wiki/Encyc lopedia
15. ^Deterding Sebastian, Rilla Khaled, Lennart E. Nacke, Dan Dixon, Gamification: Toward a Definition, CHI 2 011,Vancouver, BC, Canada
16. a, b, c, d, eBunchball.Com (2010, 10), Gamification 101:An Introduction to the Use of Game Dynamics to Influe nce Behavior. Retrieved June 2011: http://www.bunchball.com/gamification/gamification101.pdf

17. ^Kim J. Amy (2009) Metagame Design, Reward System that drive Engagment, Retrieved June 2011: http://www.slideshare.net/amyjokim/metagame-design-3383058

18. ^Hunicke, R., LeBlanc M., Zubek, R. (2004), MDA: A Formal Approach to Game Design and Game Research. Retrieved June 2015: http://www.cs.northwestern.edu/~hunicke/MDA.pdf

19. a, bSmith-Robbins Sarah (2011), —This Game Sucks‖: How to Improve the Gamification of Education, Retrieved June 2015: http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume46/ThisGameSucksHowtoImprovetheGa/222665

20. ^Priebatsch Seth (Ted talk 2010), The game layer on top of the world, Retrieved June 2011: http://www.ted.com/talks/seth_priebatsch_the_game_layer_on_top_of_the_world.html

21. a, bJeff Lopez (2011), Motivating Learning Beyond Grades, Retrieved June 2011: http://gamification.co/2011/03/09/motivating -learning-beyond-grades/

22. ^Woodbury George (2011), Using Game Mechanics to Fix the Grading System and Motivate Students, Retrieved June 2015: https://georgewoodbury.wordpress.com/2011/03/16/guest-blog-using-game-mechanics-to-fix-the-grading-system-and-motivate-students/

23. ^Lee J. Joey, Hammer Jessica, Gamification in Education: What, How, Why Bother? Academic Exchange Quarterly, 15(2),Retrieved June 2015: http://pdf.thepdfportal.net/?id=15341#

24. a, b, c, dKristian Kiili (2006), EVALUATIONS OF AN EXPERIENTIAL GAMING MODEL, Tampere University of Technology, Pori, Finland

25. ^Fong-Ling Fu, Rong-Chang Su, Sheng-Chin Yu (2009), EGameFlow: A scale to measure learners' enjoyment of e learning games, Department of Management Information System, National Cheng-Chi University

26. ^Sánchez, R. A., & Hueros, A. D. (2010). Motivational factors that influence the acceptance of Moodle using TAM. Computers in Human Behavior.

27. a, bHolden, R. J., & Karsh, B. T. (2010). The Technology Acceptance Model: Its past and its future in health care. Journal of Biomedical Informatics, 43(1), 159–172.

28. a, bHong, S. J., Thong, J. Y. L., & Tam, K. Y. (2006). Understanding continued information technology usage behavior: a comparison of three models in the context of mobile internet. Decision Support Systems, 42(3), 1819–1834.

29. a, bCsikszentmihalyi, M. (1990). Flow: The Psychology of Optimal Experience. New York: Harper and Row.

30. a, bGhani, J., & Deshpande, S. (1994). Task characteristics and the experience of optimal flow in human–computer interaction. The Journal of Psychology, 128, 381–391.

31. ^*Jackson, S. & Marsh, H. (1996). Development and validation of a scale to measure optimal experience: The flow state scale. Journal of Sport & Exercise Psychology, 18, 17–35.*

32. ^*Novak, T. P., Hoffman, D. L., & Duhachek, A. (2003). The influence of goal-directed and experiential activiti es on online flow experiences. Journal of Consumer Psychology, 13, 3–16.*

33. ^*Glover Ian (2013), Play As You Learn: Gamification as a Technique for Motivating Learners, Technology En hanced Learning, Sheffield Hallam University, United Kingdom.*

34. ^*Cristina Ioana Muntean (2011), Raising engagement in e learning through gamification, The 6th Internati onal Conference on Virtual Learning ICVL 2011, University of Bucharest and "Babeş-Bolyai" University of C luj-Napoca, Romania*

Declarations

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.