

EFFECT OF GAMING ON BEHAVIORAL INTENTION TO USE ONLINE TRAINING: AN ADJUSTMENT OF THE UTAUT MODEL APPLIED TO TRT-2

EFEITO DA GAMIFICAÇÃO NA INTENÇÃO DE USO DE TREINAMENTOS ON-LINE: UMA ADAPTAÇÃO DO MODELO UTAUT APLICADO NO TRT-2

Submission: 29/03/2016

Accept: 15/07/2017

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ABSTRACT

The objective of this research was to analyze the effect of gamification on intention to use online training from the partial validation of the UTAUT model for qualification of members and servers of the Regional Labor Court of the 2nd Region (TRT-2). The study analyzed the relationship between constructs performance expectancy, effort expectancy, facilitating conditions, and familiarity with the intention to use gaming in distance media. This was conducted through an empirical application, which used the Structural Equation Modeling (SEM) for data analysis. The research was a single cross-sectional survey, carried out with TRT-2 members and servers who participated in the distance-feeding course 'Healthy Living' in 2015. Of the four hypotheses, only familiarity (F) was not significant as it did not serve as a behavioral intentions (BI) predictor of gamification for distance learning courses. Some explanations for such phenomenon may be career promotion and additional qualifications, learning by doing and sample size. The results confirmed that most hypotheses have a high statistical significance of the structural paths and have demonstrated that the model proposed in this study is consistent and can be applied in future studies with appropriate adjustments.

Keywords: Behavioral intention. Gamification. Online training. Structural Equation Modeling.

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RESUMO

O objetivo desta pesquisa foi analisar o efeito da gamificação na intenção de uso de treinamentos on-line a partir da validação parcial do modelo UTAUT para capacitação de membros e servidores do Tribunal Regional do Trabalho da 2ª Região (TRT-2). O estudo analisou a relação entre os construtos: a) expectativa de desempenho, b) expectativa de esforço, c) condições facilitadoras e d) familiaridade com a intenção de uso de curso a distância gamificado por meio de aplicação empírica, que utilizou a Modelagem de Equações Estruturais (MEE) para a análise de dados. A pesquisa foi do tipo survey em corte transversal único, realizada com membros e servidores do TRT-2 que participaram do curso a distância (on-line) Alimentação para uma Vida Saudável em 2015. Das quatro hipóteses, apenas familiaridade (F) não obteve significância, não servindo como preditor de intenção de uso (IU) da gamificação para cursos a distância. Algumas explicações para tal fenômeno podem ser: promoção na carreira e adicional de qualificação, aprender fazendo e dimensionamento da amostra. Os resultados confirmaram que a maioria das hipóteses possui grande significância estatística dos caminhos estruturais e demonstraram que o modelo proposto neste estudo é consistente e poderá ser aplicado em futuras pesquisas com ajustamento adequado.

Palavras-chave: *Intenção de uso. Gamificação. Treinamentos on-line. Modelagem de equações estruturais.*

1 INTRODUCTION

Games have existed throughout human civilization. Since 1980, the gaming industry has achieved great success with videogames and computer games. Currently, games appear in various contexts of everyday life; the phenomenon is called gamification, whose term derives from behavioral economics (JAGODA, 2014). Games have been popularized due to the mobility of smartphones, tablets and mobile internet, and is innovative in the way the elements of games have been applied in real life in a ubiquitous and social way (KIM, 2015).

Games typically consist of the following elements: Scoring system, progress bar, levels, virtual currencies, badges, ranking, avatars and countdown clock (DICHEVA et al., 2015).

In the context of public service, encouraging participation in training and qualification events is important for a good judicial performance. In the Regional Labor Tribunal of the 2nd region (TRT-2) a distance course with game elements was developed and implemented to test the acceptance of this new trend by its members and servers. The structure of this gamified course in different environments can be applied to meet other types of audiences.

In its planning phase, the course took into account the characteristics of the participants (GONZÁLEZ-SÁNCHEZ; GIL-IRANZO, 2013, ROBSON et al., 2014). Some of them were born before the advent of web 2.0 and some were familiar with this type of technology from childhood. The intent was to provide all participants with a challenging, yet playful learning space in which they could experience, reflect, think and act, and be responsible for their own learning (KOLB; KOLB, 2010), to the extent that they knew the learning objectives of each level (FERRAZ; BELHOT, 2010).

Four classes of this course were offered from August to November 2015, with 136 graduates invited to respond to a research of intent to use technology, applied from November to December of 2015.

Venkatesh et al. (2003) compared eight models of acceptance of technology and created the Unified Theory of Acceptance and Use of Technology (UTAUT), whose constructs (latent variables) play an important role as determinants of acceptance and behavior of the individual's use. These are: performance expectancy, effort expectancy, social influence and facilitating conditions. The UTAUT model has already been used in studies on higher education (KHECHINE et al., 2014), corporate education (CHENG et al., 2011), and training of public servants (ALRAWASHDEH et al., 2012).

This research aims to analyze the effect of gamification on the intention of using online trainings from the partial validation of the UTAUT model for training of members and servers of TRT-2. The study analyzed the relationship between the constructs: performance expectancy, effort expectancy, facilitating conditions and familiarity with the behavioral intention (intention of using) in distance education with game elements.

This work is presented in the following sections introduction, theoretical construction and hypotheses, methodological procedures, analysis of results, and finally, the conclusions with academic and managerial implications, limitations and suggestions.

2 THEORETICAL CONSTRUCTION AND HYPOTHESES

This section discusses the main topics that gave theoretical support to the study of the theme. To facilitate understanding, the theoretical framework is segmented into three topics: (2.1) distance education and the Kolb cycle; (2.2) gamification in different contexts and their employment in distance education and (2.3) models for evaluating the use of technologies.

2.1 Distance education and the Kolb cycle

“Digital natives,” are those born in the midst of laptops, smartphones, videogames and the Internet, in which information is distributed in enormous speed and volume. These individuals have patterns of thought for processing information different than that of “digital immigrants,” or those who were not born in the digital world and had to learn to use technology later. For the latter, online education can be challenging, because they usually prefer to read paper texts rather than read on the screen, and do step-by-step activities individually (PRENKSY, 2001).

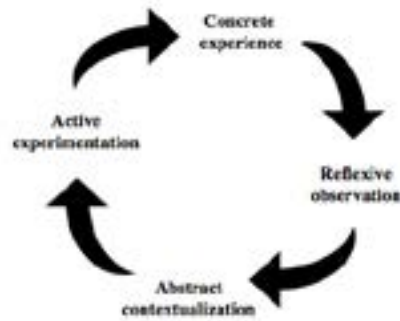
Distance education is more than just technology; technology is only the means of instruction delivery. With a posture of pro-activity, responsibility, organization, planning and autonomy, both native and digital immigrants can acquire and transmit knowledge at any time and anywhere, simply by developing the competencies necessary for the teaching modality (BEHAR; SILVA, 2012).

The Judicial School of TRT-2 (Ejud-2) fosters the development of those competencies to members and servers, while creating training courses that take into consideration the instructional design model, ADDIE (Analysis, Design, Development, Implementation, and Evaluation), Bloom’s taxonomy for defining objectives, and the significant learning cycle of Kolb and Kolb (2005). These are considered in conjunction with Web tools 2.0, so that knowledge is acquired and produced collectively.

The ADDIE model is a generic model of instructional design, an acronym for the phases of analysis, design, development, implementation and evaluation. The instructional objectives of the course are defined in the analysis phase and are described according to the Bloom taxonomy (FERRAZ; BELHOT, 2010).

The cycle works as follows: There are two ways of obtaining experience: concrete experience (CE) and abstract contextualization (AC); along with two ways of transforming experience, reflective observation (RO) and active experimentation (AE). Experiential learning is a process of building knowledge in the form of a cycle or spiral. This process involves a creative tension between the four learning modes, responding to contextual demands in which it is necessary to experience, reflect, think and act. The cycle is presented in Figure 1 (KOLB; KOLB, 2005).

Figure 1. Kolb cycle



Source: adapted from Kolb and Kolb (2005, p. 195).

Experiential learning as proposed by Kolb and Kolb (2005), focuses on the learning process in the student, attributing the ability to select the most relevant information from his perspective, in addition to learning through personal experience. Thus, the learning space should not be unique, but rather a framework of reference in which several ways of learning must be correlated, among them the playful form.

The study by Maki and Maki (2007), concluded that distance students often have superior results than those of the traditional model since the course is based on robust methodology. Britt (2004), states that although there are countless theories of learning applicable to the Ensino distance, currently the most robust is the proposal by Kolb and Kolb (2005). The Ejud-2's online learning space is Moodle, where self-instructional and collaborative courses are made available. In this environment it is possible to insert game elements as a teaching strategy to make learning more meaningful for students.

2.2 Gamification in different contexts and their employment in distance education

Gamification is the use of game elements in contexts unrelated to games (DETERDING et al., 2011). The promise of gamification is to make tasks fun, transforming them into an interactive and active experimentation-oriented activity (JAGODA, 2013; KOLB, KOLB, 2005).

Gamification features can be divided into three components: achievements, interpersonal relationships and role-playing. The game elements in achievement are: a) rewards, which can be in the form of points or equivalents; b) setting goals, in which the most difficult to achieve are the most motivating; c) reputation, which may include special titles or highlighted profiles; and d) status, which indicates fame, prestige and respect. In interpersonal relationships, the elements of games are a) instruction, to teach beginners to interact; b) competition, highlighting the ranking; and c) altruism, the willingness to interact reciprocally with the others on the basis of trust. Finally, the game elements in role-playing are: a) identification with the group, which facilitates collaborative activities; b) self-expression, which can be in the form of avatars and virtual spaces; and c) pressure by time, which is a time limit to perform a certain task, and can be represented by a clock with countdown or bar time (HSU et al., 2013). Kelley and Johnston (2012), add voluntary participation as a game element.

In this type of gamification, the social component is relevant to the motivation of users. When they are with their peers voluntarily, the participants increase their skills and autonomy, based on the feedback received (BOULOS; YANG, 2013; AHOLA et al., 2013; DRELL, 2014).

In the area of product design, gamification has been used to obtain social participation and loyalty to the brand, through rewards that reward actions or behavioral changes (GONZÁLEZ-SÁNCHEZ; GIL-IRANZO, 2013).

In education, gamification is mainly used to motivate and involve students, capturing their attention to the point of dedicating their leisure time (DICHEVA et al., 2015; KIM, 2015; KELLEY; JOHNSTON, 2012).

Using game mechanics in education promotes new learnings different from traditional reading and writing skills (JAGODA, 2013; JAGODA et al., 2015), through, among others, the following elements: levels, missions, avatars, incentives, character creation, search for content knowledge and receiving constant feedback (VRASIDES; SOLOMOU, 2013; KIM, 2015).

However, certain game elements work best for one area and others may be harmful, supporting the idea of Spencer (2013), which states that gamification can promote selfish and competitive behavior rather than collaboration if planning is not done. Therefore, for the participant to have a good experience, during the planning it is important to know who these participants will be (GONZÁLEZ-SÁNCHEZ; GIL-IRANZO, 2013; ROBSON et al., 2014).

The course developed by the Ejud-2, considered recent research regarding the game elements that motivate students in their teaching-learning process, and implementation challenges and limitations of the virtual learning environment Moodle. The following game elements were inserted: progress bar, badges, levels, language and game vocabulary (e.g. rules, missions, Guru, menu), course presentation and animation-format levels with storytelling, quiz in the format of trivia game, completion of activities, element of surprise as a reward for those who did all the activities, treasure hunt and scoring system.

2.3 Models of assessment of the use of technologies

After doing an empirical comparison study between eight main models of the use of technologies, Venkatesh et al. (2003), developed the Unified Theory of Acceptance and Use of Technology (UTAUT), whose constructs are: performance expectancy (using a system will help you to have performance gains at work), effort expectancy (the degree of ease associated with the use of System), social influence and facilitating conditions.

As the UTAUT model emphasizes extrinsic motivation, there are gaps in this model, which were complemented in the UTAUT2 model. Hedonic motivation, price and habit constructs were included in the later model (VENKATESH et al., 2012; RAMÍREZ-CORREA, 2014).

In the area of higher education, Khechine et al. (2014) have tested the intention of using webinar systems in a higher-level course in Canada in the blended learning format (hybrid teaching) with the UTAUT model. They observed that performance expectancy has a positive effect on the intention of using webinar systems.

In the area of qualification of public servants, Alrawashdeh et al. (2012) tested the intention of using online distance training system by public servants and the performance expectancy had a direct effect on intent to use.

In Brazil, the UTAUT2 model was applied to test the acceptance of Internet use in smartphones by undergraduate and graduate students (FARIA et al., 2014).

Attuquayefio and Addo (2014) did an analysis of studies that used the UTAUT model and its extensions. The results show that most studies have results consistent with the original postulations by Venkatesh et al. (2003).

For this study, we used the UTAUT model, and since the target audience of the course is not formed by consumers, the construct social influence was removed from the model. This was done because members and servers do not have access to the courses offered by the Ejud-2, except if they work in the organization. The level of expertise with gamification tools was adapted to the UTAUT model because it is the main determinant of consumers' reaction in relation to its experience with technological resources.

In this research we selected the following constructs to be observed: "performance expectancy", "effort expectancy", "facilitating conditions", and "familiarity".

"Performance expectancy" originates from the Rogers construct (2003), perceived usefulness, and was later incorporated into the TAM model of Davis (1989), and TAM 2 (VENKATESH; MORRIS, 2000), with a large capacity to explain the intention of continued use. It is defined by the degree to which each individual believes that, using the system will help to achieve tasks or activity performance.

Similarly, "effort expectancy" originates from the work of Rogers (2003), and specifically refers to the construct ease of use, also incorporated into the TAM model of Davis (1989), and TAM 2 (VENKATESH; MORRIS, 2000). This indicates the degree of ease associated with the use of the system.

"Facilitating conditions" is also a construct originating from the work of Rogers (2003). This is the compatibility construct, being adapted to the models of acceptance of technology as a degree in which the individual believes that the organizational or technical infrastructure exists to support the use of a certain type of system.

So "performance expectancy" is the level to which using a technology can provide benefits to consumers when performing certain activities; "effort expectancy" is the level of consumer ease when using technology; and "facilitating conditions" refers to consumers' perceptions on the resources and support available (BROWN; VENKATESH, 2005, VENKATESH et al., 2003). Therefore, the following hypotheses are identified.

Hypothesis 1: Performance expectancy positively affects behavioral intentions (intention of using) of distance courses that have game elements.

Hypothesis 2: Effort expectancy positively affects behavioral intentions (intention of using) of distance courses that possess game elements.

Hypothesis 3: Facilitating conditions positively affect the familiarity of distance courses that have game elements.

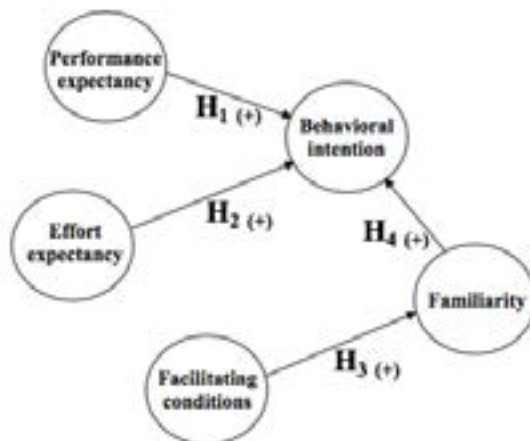
In this study, we remarked on the inclusion of a latent variable "familiarity" with the purpose of observing personal characteristics within this interaction process. In view of this reasoning, the user would seek environments in which he could use more frequently innovative learning practices and that would lead to searching for teaching products with a higher level of technical complexity, generating benefits over time (ZHAO, 2006). In this sense, the following hypothesis was formulated.

Hypothesis 4: Familiarity positively affects the behavioral intentions (intention of using) of distance courses that have game elements.

Finally, the dependent variable of the proposed model originated in the works of Fishbein and Ajzen (1975), with emphasis on the Theory of Reasoned Action (TRA), which seeks to explain the intent of behavior based on subjective attitudes and norms. The construct in question refers to the intention that the individual has in relation to continue using and recommending a distance course that possesses elements of games.

The hypotheses are shown schematically in the following Figure 2.

Figure 2. Research Hypotheses



Source: author elaboration.

3 METHODOLOGICAL PROCEDURES

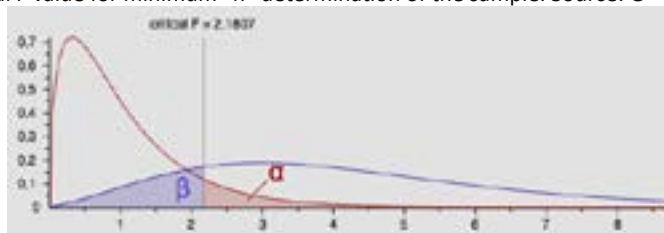
This section presents the following constitutive elements: participants, instruments, procedures and data processing.

3.1 Participants

The population of this article consisted of members and servers of the TRT-2 who participated in the course “Feeding for a healthy life” in the distance modality (online) with tutoring, during the period from August 12 to September 15, 2015 (Classes 3 and 4) and October 7 through November 10, 2015 (classes 5 and 6). The inclusion criterion was convenience, therefore, it is a non-probabilistic sampling (MALHOTRA, 2014). The research comprised of 136 people, of which 77 effectively participated.

The G*Power 3.1 software was used to identify the minimum sample size. According to the guidelines of Faul (2009), we identified the latent variable that receives the highest number of arrows, in the case of this study, the construct “behavioral intention” with three independent variables. Using the parameters: Effect size F^2 equals 0.15 and test power equal to 0.80 and $p < 0.1$, the result is a critical F of 2.18, with a minimum sample of 62 individuals, as can be seen in Figure 3. In this study, with a sample of 77 individuals, effect size F^2 equals 0.15 and three predictors, the Power test is equal to 0.88.

Figure 3. Critical F value for minimum “n” determination of the sample. Source: G * Power Software.



Note: Effect size: 0.15 in; Power test: 0.80; $P < 0.1$; Number of predictors: 3; F Critical: 2.18; Sample total size: 62 in; Test power with sample equal to 62:0.80.

3.2 Instruments and Procedures

Data were collected by means of a structured questionnaire adapted from the validated theoretical model UTAUT and adapted to the research theme. This data collection instrument consisted of 17 assertives that were answered using a five-point Likert scale, varying from “totally disagree” to “totally agree”. There was also a second part in the survey, consisting of demographic issues for establishing the respondents’ profile. “Appendix A” presents the latent and manifest variables (indicators), as well as the description of the assertives that were used as an instrument for data collection for this research.

The technique of the questionnaire was performed using the resource “research” available in the AVA course (Moodle version 2.5). The trustees were invited to participate guaranteeing the anonymity and preservation of data integrity.

3.3 Data processing

This study is characterized as a quantitative cross-sectional-single approach, with data collection performed in the last two months of 2015 (MALHOTRA, 2014). The data followed the Confirmatory Factor Analysis (CFA), which is a method belonging to the family of multivariate analysis techniques called Structural Equation Modeling (SEM). This technique allows the verification of adjustments between observed data and the theoretical model specified a deduction based on the theory that specifies the hypothetical causal relationships between the latent variables (non-observable variables) and their indicator (variables observed).

4 RESULTS

In this section, we present the main results obtained from the application of the method described on the latent variables, as well as the implication of the results on the hypotheses formulated.

The user’s profile is presented in the form of descriptive statistics obtained with the support of the IBM SPSS statistics 22 software, while the results obtained by applying the statistical procedures of PLS-SEM with the support of SmartPLS Professional 3.0 software based on which of the hypotheses will be tested and validated.

4.1 Descriptive statistic

Table 1 allows for a profile to be established that depicts the respondents of the research, according to their gender, age, time of service, level of schooling and position.

Table 1: Demographic characteristics of respondents

Features	Type	Amount	Percentage
Sex	Female	55	71.4%
	Male	22	28.6%
	Total	77	100%
Age Range	< 31	15	19.5%
	From 31 to 39	27	35.1%
	From 40 to 48	19	24.7%
	> 48	16	20.8%
	Total	77	100%

Schooling	High School	3	3.9%
	College	17	22.1%
	Stricto sensu	57	74%
	Total	77	100%
Time of service in TRT-2 (in years)	< 8	45	58.4%
	From 8 to 15	14	18.2%
	From 16 to 23	11	14.3%
	> 23	7	9.1%
	Total	77	100%
Position	Technical	36	46.8%
	Analyst	31	40.3%
	Magistrate	10	12.9%
	Total	77	100%

Source: research data.

The demographic profile of the respondents revealed in the table above allows us to affirm that 71.4% of the trustees are female, the most frequent age range is that ranging from 31 to 39 years for both sexes, and of the total, approximately 80% of the trustees are up to 48 years.

Taking the educational dimension of respondents, it is noteworthy that only 3.9% of respondents are of average level, in their totality of the female gender. However, when the graduated level of schooling was taken, the majority of male individuals (52.9%) were obtained. Finally, it was found that 77.2% of respondents with graduate education are female. It is perceived that the female gender stands out favorably in relation to males when the item analyzed is schooling.

In relation to the time of service in TRT-2, it was found that the majority of the trustees are up to 8 years, and that approximately 1 in 4 trustees have up to 15 years of service. In this way, it is noted that most of the trustees are at the beginning of their careers, which favors the search for courses in the Ejud-2, aiming at career promotion. The trustees who have more service time also seek courses in Ejud-2 to obtain additional qualification.

The respondents occupy effective positions of the TRT-2, and of the positions at all levels of complexity, women represent approximately 3 in 4 individuals, the positions with the highest male participation are those of judicial technician and magistrate; of these approximately $\frac{1}{3}$ are male.

Based on the above data, it is possible to affirm that TRT-2 trustees are mostly female, responsible for 71.4% of respondents; have up to 8 years of services provided; approximately $\frac{3}{4}$ are post-graduates, with 46.75% of the upper-level and 53.25% of high-level positions.

4.2 Normality and multicollinearity test

Within multivariate analysis techniques, using metric variables and statistical tests, multivariate normality is the most fundamental condition of application. Normality of the data was verified through the observation of the kurtosis and asymmetry present in the data sample by the K-S test (Kolmogorov-Smirnov). This procedure was necessary to limit the possibility of using statistical analysis techniques that have as characteristic the normal distribution of the data.

Multicollinearity refers to the existence of more than one exact linear relationship, which means the existence of a "perfect" (or exact) linear relationship between some or all of the explanatory variables of a regression model. The Multicollinearity test was also performed for this model, in which the Variance Inflation Factor (VIF), the confidence interval, mean and standard deviation were identified.

Therefore, in the predictive variables related to the “behavioral intention” of game elements in distance courses, it was possible to accommodate the multicollinearity in the model.

Table 2: normality and multicollinearity test

Indicator	Average	Standard deviation	Lower limit	Upper Limit	K-S Test	VIF
PE1	3.86	1.035	3.62	4.09	2,134	3.38
PE2	3.58	1.116	3.33	3.84	1,901	4.98
PE3	3.56	1.153	3.3	3.82	1,822	4.10
PE4	3.58	1.174	3.32	3.85	1,613	4.30
EE1	4.35	0.929	4.14	4.56	2,775	2.40
EE2	4.32	0.979	4.1	4.55	2,862	4.48
EE3	4.22	0.982	4	4.44	2,456	2.81
EE4	4.35	0.914	4.15	4.56	2,919	3.60
FC1	4.38	0.828	4.19	4.46	2,92	1.76
FC2	4.31	0.95	4.1	4.53	2,731	2.86
FC3	4.3	0.974	4.08	4.52	2,717	2.32
FC4	3.55	1.241	3.26	3.83	1,563	1.11
BI1	3.92	1.201	3.65	4.19	2,141	4.10
BI2	3.58	1.14	3.33	3.84	1,876	2.84
BI3	3.75	1.16	3.49	4.02	1,936	5.00
F1	5.82	1.275	5.65	6.22	2,094	5.16
F2	5.94	1.27	5.53	6.11	2,225	5.01

Source: research data.

Table 2 presents the results of the means of the variables that form the constructs of the adapted model of Venkatesh et al. (2003). Through interpretation of the data, we observed that: a) in the construct “performance expectancy”, the Variable “PE1” (3.86) was considered of greater relevance than “PE2” (3.56), the lowest one; b) in the construct “effort expectancy”, both variables “EE1” and “EE4” had the same result (4.35) being considered of greatest relevance and “EE3” (4.22), the lowest one; c) in the construct “facilitating conditions”, the variable “FC1” (4.38) was considered of greatest significance and “FC4” (3.55), the lowest; d) in the construct “behavioral intention”, the variable “BI1” (3.92) was considered of greatest relevance and “BI2” (3.58), the lowest.

Finally, the construct “familiarity” had its greatest relevance in the manifest variable “F2” (5.94), presenting that interviewees believe they have greater practical knowledge than theoretical with the use of game elements in distance courses.

Moreover, the result of the normality test corroborated the option to estimate the structural model by means of the correlation matrix in partial least squares (RINGLE; SILVA; BIDO, 2014).

4.3 Convergent and discriminant validity

Convergent validities were obtained by the observations of Composite Reliability (CR), Cronbach’s alpha (CA), the Average Variance Extracted (AVE), and of the R².

For Hair et al. (2014), Cronbach’s alpha values above 0.60 and 0.70 are considered ade-

quate in confirmatory surveys and values of 0.70 and 0.90 of CR are considered satisfactory. For this research, it can be observed in the table that all CA values are above 0.70 and all composite reliabilities are above 0.80, therefore, the results of the research were adequate and satisfactory. For CA, the lowest index was that of “facilitating conditions”, with 0.792 (Table 4).

In the analysis of CR presented in Table 2 none of the constructs obtained an index below 0.80, since the CR prioritizes the variables according to their reliabilities, the internal consistency is very sensitive to the number of variables in each construct. The lowest index was the latent variable “facilitating conditions”, with 0.865 (Table 3).

The criterion of Fornell and Larcker (1981), was used, that is, the values of AVE should be greater than 0.50. The AVE represents the mean variation of the observed variables, which are theoretically explained by a certain latent variable (construct) related to them (FORNELL; LARCKER, 1981). In the case of this research, it was observed that all values of AVE of all constructs related to the model, reflect a very satisfactory result, otherwise the variables should be eliminated (RINGLE; SILVA; BIDO, 2014). AVE is the average of the high factorial loads squared. Thus, in order to increase the value of the AVE, the variables with factorial loads (correlations) of lower value should be eliminated.

The R² value measures the predictive accuracy of the model, representing the combined effects of the endogenous variables on the exogenous variables. In marketing research studies, values close to 0.25, 0.50 or 0.75 are considered, respectively, as weak, moderate and substantial degree. In the present study, the R² value demonstrated that the model has accuracy and predictive relevance in relation to the construct “familiarity” (0.516) and “behavioral intention” (0.762), which represents, predictive accuracy moderate to “familiarity” and substantial for “behavioral intention” analyzing the variables presented (Table 3).

Table 3: General indicators of quality values of adjustment of the model

Latent variables	Number of items	Alpha de cronbach	Composite reliability	AVE	R2
Facilitating conditions	4	0.792	0.865	0.626	
Performance expectancy	4	0.944	0.959	0.855	
Effort expectancy	4	0.906	0.934	0.780	
Familiarity	2	0.944	0.973	0.947	0.516
Behavioral intention	3	0.924	0.952	0.869	0.762

Source: research data.

Discriminant validity for each latent variable is evaluated. This should share the variance in greater force with its block of indicators than with any indicator of another latent variable, so the square root of each latent variable should be greater than the correlation with the other latent variables (FORNELL; LARCKER, 1981).

Table 4: discriminant Validity: Fornell-Larcker criterion

Latent variables	(1)	(2)	(3)	(4)	(5)
(1) Facilitating conditions	0.791				
(2) Performance expectancy	0.529	0.925			
(3) Effort expectancy	0.866	0.431	0.883		
(4) Familiarity	0.719	0.400	0.701	0.973	
(5) Behavioral intention	0.555	0.849	0.533	0.392	0.932

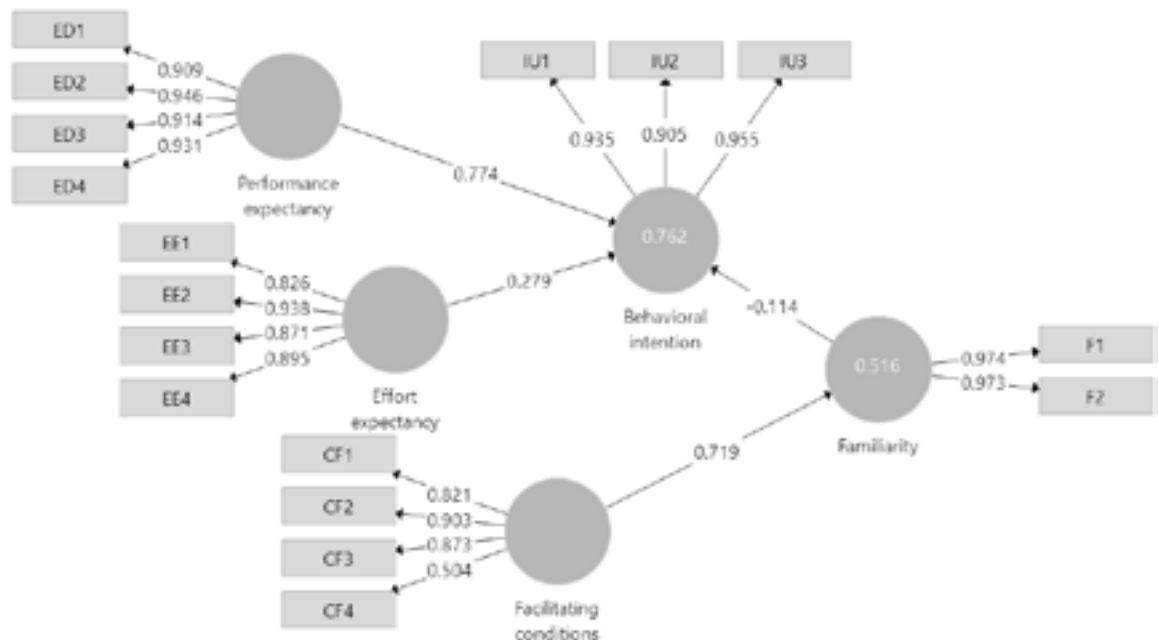
Source: research data.

Table 4 shows, in the highlighted diagonal, the square root of the AVE, and in the other fields is the correlation between the latent variables. The square root of each latent variable is greater than the correlation with the other latent variables. By the Fornell-Larcker criterion, the square root of each latent variable was higher than the correlation with all other latent variables.

4.4 Estimation, construction and evaluation of the structural equation model

In the initial model after the first iteration, in which the results of the factorial loads obtained by each construct are presented, the values of the factorial loads of each variable were observed. There were no necessary repetitions and adjustments in the model, since the definitive model (Figure 4), presented all the factorial loads of each variable with values above 0.5, ending the final model of this research. It is a reflective model, in which the direction of relation between variables is positioned of the constructs (latent variables) for the indicators (manifest variables).

Figure 4: Final model of the convergent validity of the UTAUT model adapted to distance courses that have game elements



Source: research data (Smart PLS output).

Bootstrap estimates are independent of the distribution and provide less skewed estimates. In this sense, bootstrap is a re-sampling technique that treats the sample observed as an estimate of the population (EFRON; TIBSHIRANI, 1993).

The model proposed in this study was estimated using the bootstrapping technique, which compares the original sample with the samples generated by this technique (HAIR et al., 2006; CARO et al., 2011). 500 samples were generated, and the student's t-test was performed as shown in Table 6.

Table 6: Analysis of the significance of the pathways

Paths between latent variables	β	Bootstrapping average (500 samples generated)	Standard error	T-Test	P Values	Sig.
Facilitating conditions-> familiarity	0.719	0.717	0.067	10.686	0.000	*
Performance expectancy-> behavioral intention	0.774	0.769	0.060	12.884	0.000	*
Effort expectancy-> behavioral intention	0.279	0.277	0.110	2.533	0.012	**
Familiarity-> behavioral intention	-0.114	-0.106	0.103	1.101	0.271	N.S.

Source: research data. Note: * $p < 0.000$; $p < 0.05$; N.S. = non-significant.

The results obtained in the analysis of the significance of the pathways (Table 6) showed that the vast majority of the paths (hypotheses of the research) did not differ between the original sample and the subsamples generated by the statistical technique with the limits Critical for the Student's t-Test, in which the student's t-test allows the analysis of the correlation/regression coefficients to be equal to zero (Hair et al., 2006). When the test values are close to or higher than 1.96, the correlation is significant. Student's t was considered for a confidence interval of 95% and significance of 0.05.

The model evaluates responses from participants of a recently completed course at the Judicial School of TRT-2 (Ejud-2), which proposes a relevant theme to the participants for dealing with aspects related to a healthy life. Therefore, the results come from the complete Kolb cycle, because initially the trustees came across an environment in which activities were proposed throughout a story, and at the end of each segment a gamified activity was proposed. Although the constructs employ the expression expectation, the respondent's judgment is made after the concrete experience (CE). Then evaluation of the acceptance of the technology of gamified courses was given after the construction process, with knowledge in the form of a cycle or spiral, which has unfolded from a creative tension between experimenting, reflecting, thinking and acting (KOLB; KOLB, 2005).

The causal relationship of the path "performance expectancy and behavioral intention" was which presented, in addition to a significant coefficient, the highest load on the path of intent to use the elements of games in distance courses (0.774). This means that the greater the knowledge and familiarity with the game elements, the greater the probability that these resources can assist in some way these public sector-specific students in the performance of their daily professional activities, and bringing professional benefits such as development with new Information and Communication Technologies. Another dimension to be explored is the organization of careers in the public sector. That would link the realization of courses for career promotion, causing the respondent to assign an objective result to the realization of the course, such as evolution and consequent financial returns. That also occurs with the additional qualification if the respondent reaches the number of training hours fixed in the regulation.

"Facilitating conditions and familiarity", with 0.719 load, presented a strong relationship with "behavioral intention" of gamification. This means that the higher the learning conditions (courses performed, interactivity with platforms, software and applications that can facilitate the process of communication with game elements), the greater the probability the users will become familiar with this product.

The relationship "effort expectancy and behavioral intention" presented a significant

coefficient and load of 0.279, indicating a reflection of the trainee that less effort with the engaging activities of the course with elements of gamification results in greater intent of these courses. In this way, it can be understood that, although the trustees value gamification and affirm, that it contributes to its learning process, this construct contributed modestly to the intent of the use of gamified courses. The inspection of the items that compose this construct points out the variables EE1 and EE3 as those of lower representativeness, these aspects point to a certain level of difficulty in relation to the learning of the proposed activities and their usability. The age group above 49 years of 20.8% of respondents may have contributed to this result.

Finally, the relationship “familiarity with behavioral intention” presented the lowest load (-0.114), obtaining $p > 5\%$, in this case, $p = 0.271$, indicating that this path is not significant (therefore the only hypothesis rejected was **hypothesis 4**). Although respondents had a high performance expectancy improvement employing less effort with the use of gamification strategy, there was a lower degree of “intent to use” by the trustees in relation to “familiarity”. This has considerably weakened the achievement of gamified courses. Possibly this result is due to the fact that the courses do not present the gamification strategy as a differential for the interested person, which can be verified by the low concordance in relation to the assertion present in the variable BI2 (mean=3.58).

The manifest variables F1 and F2 of the latent variable “familiarity” were measured from affirmations answered by the interviewees within a Likert scale of 1 (totally disagree) to 7 (totally agree). Although the study participants attributed a high degree of “familiarity” with gamification, the “behavioral intention” or “intention of use” cannot be considered as a projection for “familiarity”, however the existence of facilitating conditions can predict the realization of distance courses that offer this type of strategy. This result may have been influenced by the respondent’s service time. The majority of these individuals (58.4%) are at the beginning of the career, which would make them take distance courses online independently of the teaching-learning strategy used to be able to progress in the career, not only courses with game elements.

5 CONCLUSIONS AND FINAL RECOMMENDATIONS

This study seeks a preliminary advance on researches that relate elements of games within the environment of online distance courses, by means of the test adapted from the UTAUT model proposed by Venkatesh et al. (2003).

Based on the results obtained it was possible to verify that most latent variables are applicable to the acceptance and use of game elements for students of distance courses. This fact helps to analyze the factors that influence the use of gamification in courses in this modality and, consequently, encourages the development of other courses using this technology as a teaching and learning strategy.

5.1 Academic implications

The research confirmed that all hypotheses, except the fourth, are valid, because, through the analyses performed, most latent variables have significant influence on the use of game elements, less familiarity or use. That was not sustained in the model in this research. However, it is important to mention that there may be some explanations for this phenomenon: career promotion and additional qualification, learning by doing and sample size.

The fact that most respondents have less than 8 years of service, and are therefore at the beginning of their careers, also the qualification figure as an objective criterion for function-

al promotion, may have influenced the research participants to prefer not to only subscribe in courses with game elements, but in all available courses. This decision is regardless of the teaching-learning strategy employed, to achieve the number of training hours required for promotion and to receive additional qualifications.

There are two central aspects to be considered in this work: the first is the role of protagonism that the trainee assumes in the modality of distance and the other is experience. These two dimensions, if properly connected, allow the learning process to be based on learning by doing. The game elements provide the trainee with a playful learning environment in which the student learns by doing, but, when inserted into an online classroom software (Moodle), virtual learning environment, may have been considered by the majority of digital immigrants, a barrier to learning, because they are not yet familiar with the technology as the digital natives are, or because they do not believe that adults can learn in a playful way.

The latent variable “performance expectancy” proved to be the most influential on “intention of use”. This is compatible with the results obtained by the researches by Khechine et al. (2014), and Alrawashdeh et al. (2012), being in accordance with the theory of Venkatesh et al. (2003), which says that “performance expectancy” is the predictor of stronger intent.

The latent variable “facilitating conditions” was observed in the sequence as the second most influential on the “behavioral intention” or “intention of use”. This is compatible with the study by Hsu et al. (2013), in which the third most attractive element of games for collaborative sites of storytelling. It was the ease of learning the instructions, which increases the usability and involvement of users. It is also compatible with the study by Dicheva et al. (2014), in which the participants reported it being easier to learn with gamification, because it increases motivation, interest and, consequently, its use. Finally, the research of Vrasidas and Solomou (2013), also corroborates, as it concludes that the role of the instructor is important for creating a sense of security in the new gamified context.

The latent variable “effort expectancy” was the third most influential on the “intent to use”, because it may be difficult for participants to learn how to use game elements during the course, considering that the majority of participants in this research are in the age range of digital immigrants. If the technological skills and the use of online resources are limited, this does not allow the participant to actively engage in playful learning (VRASIDAS; SOLOMOU, 2013) and want to make use of this playful learning strategy in the future.

Finally, the latent variable “familiarity” did not influence the “behavioral intention” or “intention of use”, as previously justified. It is important to reinforce that the study of Vrasidas and Solomou (2013), indicated that the opportunities for exploration and involvement in the gamified environment facilitated the learning process of students through the following processes: interaction, collaboration, authentic problem solving, role-playing, immersion and instructor support with a focus on the student. In this study, the use of game elements was considered a better and effective method, however, presented challenges of complexity, time and resources, discouraging its use by those who had less or no experience with this type of technology, which could have been the case of this research, by the high number of digital immigrant participants.

Another factor may be the fact that adults no longer believe that playing is healthy by imposed social conventions (KOLB; KOLB, 2010), so they do not believe that they can use more playful strategies to have effective learning. In general, from the academic perspective, the adapted model examines some relevant issues and still little explored in the field of knowledge of gamification.

5.2 Managerial implications

The use of teaching strategies centered on the participant in the context of adult education may be beneficial to support the functional evolution in the public sector and can subsidize new models of teaching management appropriate to schools of government. Although there are favorable conditions for the use of distance learning in schools of government, there is still little familiarity of the servers with the modality, and generally a preference of classroom education. Our results contribute to positioning the organization as an entity that fosters innovation through a teaching and learning environment using creative methods with gamification, as students perceive these characteristics as important in the teaching process (CASSOL et al., 2015).

Thus, an instructor can plan the structure of the course so that all disciplines/contents can reflect this recognition of the student regarding these creative strategies using new technological resources. It is also true that teachers can be stimulated and evaluated, because they have the prerogative to contribute to the improvement of the courses, bringing ideas for the construction and restructuring of traditional courses, making them more innovative.

5.3 Limitations and suggestions for future research

The contributions brought by this study should be weighted by the limitations surrounding it. As a limitation of the study, we can highlight the small sample size, which consequently led to a result below the critical threshold recommended by the literature (HAIR, 2006). However, the purpose of this work is not the discussion of methods, but the reflection on the use of gamification techniques in the formation of public managers.

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Appendix A: Research instrument

Latent variables	Indicators	Description of assertions	References
Performance expectancy (PE)	PE1	I think taking courses with game elements is useful for my life.	Rogers (2003) Davis (1989) Venkateshand Morris (2000)
	PE2	Taking courses with game elements increases my chances of presenting better work performance.	
	PE3	Taking courses with game elements helps me accomplish my work faster.	
	PE4	Taking courses with game elements increases my productivity.	
Effort expectancy (EE)	EE1	Learning to use the game elements offered in the course is easy for me.	Rogers (2003) Davis (1989) Venkatesh and Morris (2000) Venkatesh et al. (2012)
	EE2	My interaction with the game elements is clear and understandable.	
	EE3	I find the game elements easy to use.	
	EE4	It's easy for me to become skillful in using the game elements.	
Facilitating conditions (FC)	FC1	I have the resources needed to use the game elements.	Rogers (2003) Davis (1989) Venkatesh and Morris (2000) Venkatesh et al. (2003) Venkatesh et al. (2012)
	FC2	I have the knowledge necessary to use the game elements.	
	FC3	Courses with game elements are compatible with other technologies I use.	
	FC4	I get help from other people when I have trouble using the game elements.	
Behavioral intentions (BI)	BI1	I intend to continue taking courses with game elements in the future.	Fishbein and Azjen (1975) Venkatesh et al. (2012)
	BI2	I will always try to enroll in courses that have game elements.	
	BI3	I plan to continue taking courses with game elements often.	
Familiarity (F)	F1	How much is considered familiar with game elements in EaD courses based on readings.	Venkatesh et al. (2003) Zhao (2006)
	F2	How much is considered familiar with game elements in EaD courses based on other practical experiences.	

Source: Own elaboration.