







## CREATION AND APPLICATION OF A GAMIFIED STRATEGY IN NURSING UNDERGRADUATE EDUCATION

Paulo Elias Gotardelo Audebert Delage<sup>1</sup>   
Emanuelle Silva Mendes<sup>1</sup>   
Jully Greyce Freitas de Paula<sup>1</sup>   
Iara Samily Balestero Mendes<sup>1</sup>   
Malena da Silva Almeida<sup>1</sup>   
Fernanda de Nazaré Almeida Costa<sup>1</sup> 

### ABSTRACT

**Objective:** to present the construction, application and evaluation of a gamified education strategy of scientific methodology to nursing undergraduate students.

**Method:** diagnosis of the problems of the Scientific Methodology Discipline of the nursing course of the Universidade do Estado do Pará; construction of the strategy; application in six classes over three semesters, between 2017 and 2018; evaluation of the impacts and acceptance.

**Results:** construction of a system of heuristic evolution, with repercussions on assiduity and punctuality and positive self-evaluation of the strategy.

**Final Considerations:** the gamified strategy has proved to be effective in improving the engagement of nursing undergraduate students and with potential to be an innovating pedagogical tool in nursing education. The adoption of a heuristic evolution structure distances this strategy from artificial initiatives with isolated use of game elements. More rigid evaluations, with control group, are still needed.

**DESCRIPTORS:** Education; Education, Nursing; Educational Technology; Methodology; Play and Playthings.

### CREACIÓN Y APLICACIÓN DE UNA ESTRATEGIA DE GAMIFICACIÓN EN LA ENSEÑANZA DE GRADUACIÓN EN ENFERMERÍA

#### RESUMEN:

**Objetivo:** presentar la construcción, aplicación y evaluación de una estrategia de gamificación para la enseñanza de metodología científica para estudiantes de graduación en enfermería. **Método:** diagnóstico de los problemas de la disciplina Metodología Científica del curso de enfermería de la Universidad do Estado do Pará; construcción de la estrategia; aplicación en seis clases a lo largo de tres semestres, entre 2017 y 2018; evaluación de los impactos y aceptación. **Resultados:** construcción de un sistema de evolución heurística, con impactos en asiduidad y puntualidad y autoevaluación positiva de la estrategia. **Consideraciones Finales:** la estrategia de gamificación demostró ser eficaz a la mejora del compromiso de los estudiantes de graduación en enfermería y con potencial para ser una herramienta pedagógica innovadora en la enseñanza de enfermería. La adopción de una estructura de evolución heurística distancia esta estrategia de iniciativas artificiales con el uso aislado de elementos de juegos. Se necesita asimismo evaluaciones más estrictas con grupo control.

**DESCRIPTORES:** Enseñanza; Educación en Enfermería; Tecnología Educativa; Metodología; Juego e Implementos de Juegos.

## INTRODUCTION

Gamification is the process of doing activities in a game format, providing typical game experiences<sup>(1)</sup>. It is the planning of activities, adopting game elements, without necessarily building or using complete games.

Despite the multiplicity of existing game formats (digital, board, sports) and mechanical (cooperative, competitive, individual), four elements are common to all: (1) goals, which must indicate a main objective and intermediaries; (2) rules, which determine ways to achieve goals, creating the notion of challenge; (3) feedbacks, which provide information about progress and disobedience to rules; and (4) voluntariness, otherwise it would be a duty and not a game<sup>(2)</sup>.

In gamified systems, these elements have counterparts: (1) dynamics, which are the structure of the system, including goals, narratives and sense of progression; (2) mechanics, which are the rules and interactivity; and (3) components, which are the products of the mechanics' follow-up and include the points, trophies and prizes<sup>(3)</sup>.

Gamified strategies have been adopted in areas such as corporate<sup>(4)</sup>, health<sup>(5)</sup> and education<sup>(6)</sup>, being particularly useful in the latter. A review showed that of 208 articles on gamification published between 2008 and 2016, 94 were applied to education (45.19%), in comparison, for example, to 23 in health (11.06%) and 17 in marketing (8.17%). Despite this profusion, there is a lack of works that evaluate its success, since 97 articles (46.63%) presented only conceptual arguments for its adoption<sup>(7)</sup>.

A review on gamification in education showed that of 63 articles on gamification in education published between 2014 and 2016, 44 (70%) addressed its use in higher education. However, 20 of the 44 (45.4%) reported initiatives applied to Information Technology (IT) courses in contrast to five on health. It was identified that only 16 (36.4%) gamified entire disciplines and that all of these were online. A single study used game dynamics and mechanics, in contrast to the others, which were limited to using disjointed components<sup>(3)</sup>.

The adoption of isolated components has incurred in the model called PBL (Points, Badges and Leaderboards), where game elements are introduced in an arbitrary and disjointed way, failing to create a game system. An alternative to this trend is the observation of the motivational factors of games, leading to the creation of systems with multiple motivational cores<sup>(8)</sup>. In addition, one of the factors indicated as crucial for the success of gamified strategies in education is the creation of systems of heuristic evolution<sup>(3)</sup>, where progress in the "game" serves as a condition and motivation for the continuity of the process, simulating the sensation of evolution provided by electronic games, to the detriment of the adoption of isolated rewards for the fulfillment of specific tasks.

The adoption of gamification in higher education has grown, but there is still little information about its real impact and lack of initiatives to use it in a systemic way and in regular disciplines. Thus, our goal is to present the process of construction, application and evaluation of a gamification strategy for teaching and its impacts in six undergraduate nursing classes.

## METHOD

The scenario was the graduation course in nursing at UEPA (Universidade do Estado do Pará), in the discipline of Scientific Methodology, with a weekly workload of three

consecutive hours. The choice was for being the discipline taught by the first author and for being a discipline normally considered boring and monotonous by students<sup>(9)</sup>.

The strategy was applied with six morning and afternoon shift classes for three semesters between 2017 and 2018. All 131 enrolled students participated in the gamification and were invited to join the research, and 94 accepted the invitation and signed the Free and Informed Consent Form (ICF). As the main researcher was also a professor of the discipline, the invitation and data collection were presented by scholarship holders and volunteers from the research group, thus guaranteeing the confidentiality of the participants and avoiding any type of coercion or embarrassment to participate in the research.

The implementation took place in three moments: (1) diagnosis of the situation and creation; (2) application; and (3) evaluation of the strategy. The diagnosis was based on the teacher's perception of previously observed problems, based on the informal evaluations made at the end of the course in previous semesters, in which a round of conversation was held with the students about their perception of the positive and negative points of the course; the survey of absenteeism and the teacher's informal perception of the participation and engagement of the students. From this survey, it was up to the group of authors to raise game elements<sup>(2)</sup> relevant to the problems identified and create a system, integrating these elements. The third stage began on the first school day of each semester, with the presentation of the rules, and was concluded with the closing of the course and delivery of the final score at the end of the school term. After the closing of each subject offer and delivery of the grades, a questionnaire with a Likert type scale was applied to the students on the impact of the strategy on their performance.

The project was approved by the Research Ethics Committee of the Faculdade de Enfermagem da UEPA, with the number 2,099,492.

## DISCUSSION

### Construction and Application

Based on the evaluations made by students in previous semesters, it was found that there was an excess of expository classes, which, associated to the technical and formal nature of the contents, made the classes perceived as tiring and uninteresting. This finding can be corroborated by a high absenteeism, with an average of 4.8 absences per student in the three previous semesters. Another problem was the lack of adoption of the available materials, including work manuals and templates, with 58.3% of students delivering work outside the institution's norms. A low punctuality and departures during classes were also informally evaluated.

For the construction of the gamified strategy, a dynamic of heuristic evolution was adopted, where the rewards facilitated the progress in the "game" and obtaining new rewards; mechanics of distribution of experience points (XP – of the English Experience Points) by fulfillment of tasks, weekly feedbacks and system of rewards; and as components, awards by levels and trophies.

The heuristic evolution focused on the development of the students, henceforth called "players", who accumulated XP and moved to higher levels, receiving bonuses that facilitated their development in later stages. This is a common dynamic in RPG games, where players unlock skills (boosters) as they evolve<sup>(8)</sup>, and that goes beyond the simple distribution of prizes for fulfilling tasks, since it creates a sense of constant growth and the rewards are not arbitrary, but become benefits that help the progress within the system. Thus, when reaching Level 2, for example, the player would receive the templates of the work, increasing the chances of receiving more points by following the rules in future

activities. All started the semester at level 0 and could reach level 10 (Figure 1):

Level	XP Required	Unlocked Ability
0	0	None
1	1,000	Receive paper templates (pdf)
2	2,500	Receive paper templates (doc)
3	4,500	Access to past documents
4	7,000	Early correction of work
5	10,000	Discount at the lecture "Health Education"
6	14,000	Cost help for the action materials
7	19,000	Negotiation of intermediate deadlines
8	27,000	Correction of presentation slides
9	35,000	Converting Excess XPs into notes
10	40,000	Certificate: student model 2017/2

Figure 1 - XP requirement for each level and its rewards. Belém, PA, Brazil, 2019  
Source: Authors (2019)

One of the mechanics was the distribution of XP in accordance with tasks fulfillment(8). It is directly related to the heuristic evolution, since it is through it that players receive the XP for their evolution. Before each task a summary was given, indicating the values in XP and the criteria for obtaining them. When receiving, for example, instructions for the elaboration of a report, guidelines were presented about its content, the expected score for each section and its criteria (Figure 2).

Introduction (200 XP)	Clear Presentation of Theme and Objectives	30
	Work Contextualization	30
	Theoretical Rationale (general and specific)	80
	Quotations consistent with ABNT	50
	Closing of the Introduction	10

Figure 2 - Operationalization of the evaluation criteria of the report introduction and its values in XP. Belém, PA, Brazil, 2019  
Source: Authors (2019)

The other adopted mechanics was the feedbacks system, which must be clear, systematic and immediate<sup>(8)</sup>. Unfortunately, given the volume of activities to be analyzed, the feedback was not issued immediately, being sent to each player every Friday by e-mail, with their progress in a PowerPoint® file. Thus, the player had information about his level; the amount of XP for the next level; the XP distributed until the moment and the following week (Figure 3).

ACTIVITIES + CRITERIA	VALUE	POINTS
<b>Mandatory Elements</b>	<b>800</b>	<b>600</b>
Introduction	200	200
Method	200	100
Results	200	100
Final considerations	200	200
<b>1st Report Version</b>	<b>500</b>	<b>425</b>
Delivery on time	150	150
Formatting	150	75
Mandatory sections	200	200
<b>TOTAL</b>	<b>1.300</b>	<b>1.025</b>

EXPERIENCE POINTS (XP)	WEEK 3	TOTAL
Available	1.300	5.800
Achieved	1.025	5.525

LEVELS	
Current Level	3
Maximum possible level	3
XP to next level	1.475

PRÓXIMA SEMANA	
XP Available	2.300
Maximum possible level	4

Figure 3 - Example of experience points distribution and weekly progress of a player in the third school week. Belém, PA, Brazil, 2019

Source: Authors (2019)

The components were awards and trophies, both presented in the same file. The awards were represented by classic game images and an indication of their effect. The trophies were presented in a list format to be completed.

The awards were based on practices already adopted in previous versions of the discipline offered in previous semesters, such as the provision of templates. The difference is that previously these templates were delivered at the beginning of the semester and indicated as mandatory material, while in gamification they were won and seen as benefits for progress. The change in the presentation and function of this type of material was based on the principle of scarcity, one of the motivational nuclei of gamification<sup>(8)</sup>.

Trophies are markers of conquests. Their appeal is related to the collecting<sup>(8)</sup>. At the beginning of the semester, a list of the trophies to be conquered was given, which were "unlocked" as some criteria were satisfied. There were nine bronze (easy) trophies; six silver (intermediate); five gold (difficult); and one platinum, which depended on the conquest of all the trophies.

## Gamified Strategy Evaluation

Much of the exhibition content was replaced by activities to which the XP was assigned. The class on references, for example, took on a gymkhana format and became

the most praised class by students, reinforcing the positive impacts of active methodologies in education<sup>(10)</sup>.

Absenteeism dropped from 4.8 to 1.1 (one) absence during the gamification period and an improvement in punctuality and reduction of room exits was observed, reinforcing the role of increased engagement, expected from gamification<sup>(3)</sup>.

The proportion of students who ignored the templates fell from 58% to 30%. This change can be due to both the value added to the activities, which besides being rated XP, and the change in the function of the template. Traditionally, the templates were only an academic requirement and now they have become an achievement, generating a boost effect<sup>(8)</sup>.

The evaluation of the gamified strategy was completed by 94 students (71.8% of the total number of graduates). 84 (89%) considered that the strategy positively affected their performance; 83 (88.3%) that it affected their attendance; 81 (86.2%) that it affected their punctuality; 87 (92.5%) that it had a positive impact on their participation in classes; and 89 (94.7%) that it affected their whim. The evaluation of the elements showed that 79 (84%) considered that the awards had impact on her performance; 78 (83%) considered the trophies as positive; and 83 (88.3%) evaluated as high the impact of the weekly feedbacks. These data corroborate the findings in researches that used similar methodologies<sup>(3)</sup>.

## FINAL CONSIDERATIONS

The adoption of gamification in higher education has increased, but initiatives to gamble entire disciplines, adopting dynamics and mechanics to the detriment of isolated elements, are still rare<sup>(3)</sup>. This experience has demonstrated that starting from a diagnosis and creating an individualized system has produced positive results.

The dynamics of heuristic evolution generated a sense of growth, so that the XPs assumed a distinct function from the notes. While these have a previous and watertight character, they are an opportunity for growth and evolution.

The self-assessment of the strategy's impact also showed a positive result. Considering that this is a discipline commonly shunned by students, the adoption of the strategy was useful not only for producing greater engagement, but also for improving students' perception of the discipline.

Initiatives such as these are useful in demonstrating the positive impact of replacing aversive and coercive strategies with strategies based on a sense of self-realization and personal progress and the creation of environments favorable to learning. This can be particularly useful in cross-curricular disciplines at the beginning of the course, when there is a lack of clarity about the importance of such content, which can lead to demotivation by students.

Despite initial positive results and favorable perception by students, new applications are still needed, with stricter evaluations of the impact on academic commitment and performance, preferably involving quasi-experimental procedures with control groups.

## ACKNOWLEDGEMENTS

We are grateful to the Fundação Amazônia de Amparo a Estudos e Pesquisas (FAPESPA - Notice 024/2017) and to the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES - Process 1628033) for the concession of Scientific Initiation Scholarship and Master's Degree to the second and third authors, respectively.

## REFERENCES

1. Werbach K. (Re)Defining gamification: a process approach. In: Spagnolli A, Chittaro L, Gamberini, L. Persuasive technology [Internet]. Padua, Italy: Springer International Publishing; 2014. [accessed 05 mai 2017]; Available from: [http://link.springer.com/chapter/10.1007/978-3-319-07127-5\\_23](http://link.springer.com/chapter/10.1007/978-3-319-07127-5_23).
2. McGonigal, J. A realidade em jogo. Rio de Janeiro: Best Seller; 2012.
3. Dichev C, Dicheva D. Gamifying education: what is known, what is believed and what remains uncertain: a critical review. Int. J. Educ. Technol. High. Educ [Internet]. 2017 [accessed 13 nov 2019]; 14(9). Available from: <http://doi.org/10.1186/s41239-017-0042-5>.
4. Celano J, Leite W, Silva FP da. A gamificação e a necessidade constante de mudanças nas organizações. Comunicação e mercado [Internet]. 2015 [accessed 13 nov 2019]; 4(10). Available from: <https://www.unigran.br/dourados/mercado/paginas/arquivos/edicoes/10/1.pdf>.
5. Johnson D, Deterding S, Kuhn KA, Staneva A, Stoyanov S, Hides L. Gamification for health and wellbeing: a systematic review of the literature. Internet Interventions [Internet]. 2016 [accessed 13 nov 2019]; 6. Available from: <https://doi.org/10.1016/j.invent.2016.10.002>.
6. Klock ACT, Carvalho MF de, Rosa BE, Gasparini I. Análise das técnicas de gamificação em ambientes virtuais de aprendizagem. RENOTE [Internet]. 2014 [accessed 13 nov 2019]; 12(2). Available from: <https://seer.ufrgs.br/renote/article/view/53496/33013>.
7. Bozkurt A, Durak G. A systematic review of research: in pursuit of homo ludens. Int J Game Base Learn. [Internet]. 2018 [accessed 13 nov 2019]; 8(3). Available from: <http://doi.org/10.4018/ijgbl.2018070102>.
8. Chou YK. Actionable gamification: beyond points, badges and leaderboards. Los Angeles: Octalysis Media; 2015.
9. Rodrigues FWA, Ramos ABB. Metodologia científica: análise e reflexão sobre a percepção dos graduandos. Int. J. Educ. Teach [Internet]. 2019 [accessed 20 maio 2020]; 2(1). Available from: <http://doi.org/10.31692/2595-2498.v2i1.90>.
10. Diesel A, Baldez ALS, Martins SN. Os princípios das metodologias ativas de ensino: uma abordagem teórica. Revista Thema [Internet]. 2017 [accessed 18 maio 2019]; 14(1). Available from: <http://periodicos.ifsul.edu.br/index.php/thema/article/view/404>.

**HOW TO REFERENCE THIS ARTICLE:**

Delage PEGA, Mendes ES, Paula JGF de, Mendes ISB, Almeida M da S, Almeida F de N. Creation and application of a gamified strategy in nursing undergraduate education. Cogitare enferm. [Internet]. 2021 [accessed "insert day, month and year"]; 26. Available from: <http://dx.doi.org/10.5380/ce.v26i0.70221>.

Received: 18/11/2019

Approved: 23/07/2020

Associate editor: Susanne Elero Betioli

**Corresponding author:**

Paulo Elias Gotardelo Audebert Delage  
Universidade do Estado do Pará – Belém, PA, Brasil  
E-mail: [gotardelo@gmail.com](mailto:gotardelo@gmail.com)

**Role of Authors:**

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - PEGAD, ESM, JGFP

Drafting the work or revising it critically for important intellectual content - PEGAD, JGFP, FNAC

Final approval of the version to be published - ESM, FNAC



Copyright © 2021 This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original article is properly cited.