

Implementation of gamification strategies and their adequacy to different contexts in an anatomy and histology monitorship: an experience report

Implementação de estratégias de gamificação e sua adequação à diferentes contextos numa monitoria de anatomia e histologia: um relato de experiência

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ABSTRACT | INTRODUCTION: Young people are increasingly connected to the fast-paced digital world, changing the way they learn. Thus, passive methodologies are being complemented by active ones, such as gamification strategies, aimed at increasing engagement and motivation. In this scenario, the Intercursos Morfofuncional Sciences Group - (GCMi), affiliated with the Escola Bahiana de Medicina e Saúde Pública, implemented the use of badges/stickers in anatomy and histology teaching. **EXPERIENCE REPORT:** In the second semester of 2020, due to the COVID-19 pandemic, tutoring activities became remote. For each activity completed, students earned a badge, a *GCMini*, representing the acquisition of a specific skill or knowledge. Each type of *GCMini* had an associated value. At the end of the semester, a virtual Sticker Album was made available for students to place their earned *GCMinis*, and a final grade was assigned to the album, used as an assessment method. **DISCUSSION:** The use of badges during learning was considered fun, activating childhood memories and arousing positive emotions. Others reported that the activity was time-consuming. Due to the study's methodological limitations, it is not possible to measure the true impact of implementing *GCMinis* on the teaching-learning process. **CONCLUSION:** Students were motivated to complete the proposed activities and to participate in meetings with tutors. The implementation of this teaching resource reveals the need for innovations in medical education, allowing for adaptations to new realities and virtual resources, improving the student and tutor experience in the teaching-learning process. However, future research is needed to assess the extent of this impact.

KEYWORDS: Gamification. Medical Education. Badges and Insignia. Tutoring.

RESUMO | INTRODUÇÃO: Os jovens estão cada vez mais ligados ao acelerado mundo digital, o que muda a forma como aprendem. Assim, a metodologia passiva vem sendo complementada pela ativa, a exemplo das estratégias de gamificação objetivando aumentar o engajamento e a motivação. Nesse cenário, a monitoria Grupo de Ciências Morfofuncionais Intercursos (GCMi), vinculada à Escola Bahiana de Medicina e Saúde Pública, implementou no ensino da anatomia e histologia o uso de emblemas (*badges/figurinhas*). **RELATO DE EXPERIÊNCIA:** No segundo semestre de 2020, em decorrência da pandemia de COVID-19, as atividades da monitoria passaram a ser telepresenciais. A cada atividade realizada o aluno ganhava um emblema, os *GCMinis*, representantes da aquisição de determinada habilidade ou conhecimento. Cada tipo de *GCMini* possuía um valor associado. Ao fim do semestre, um álbum de figurinhas virtual foi disponibilizado para que os alunos colocassem os *GCMinis* recebidos e uma nota final foi atribuída ao álbum, utilizado como método avaliativo. **DISCUSSÃO:** O uso de emblemas durante a aprendizagem foi considerado divertido, ativando memórias da infância e despertando emoções positivas, outros relataram que a atividade demandava bastante tempo, com prazos insuficientes. Devido às limitações metodológicas do estudo, não é possível mensurar o real impacto da implementação dos *GCMinis* no processo de ensino-aprendizagem. **CONCLUSÃO:** Notou-se um estímulo desses estudantes para realizar as atividades propostas, além de incentivar a participação nos encontros com monitores. A implementação desse recurso de ensino revela como inovações no ensino médico são necessárias, permitindo adaptações a novas realidades e aos recursos virtuais, melhorando a experiência do aluno e do monitor no processo de ensino-aprendizagem. No entanto, estudos investigativos futuros são necessários para avaliar a dimensão desse impacto.

PALAVRAS-CHAVE: Gamificação. Educação Médica. Emblemas e Insígnias. Tutoria.

1. Introduction

Young students are gaining access to the fast-paced digital world at an increasingly early age, changing the way they deal with knowledge transfer. As a result, exclusively passive learning processes (e.g., lectures, presentations, and slide shows) tend to be incompatible with the rapid pace at which this generation consumes information¹. Given this scenario, educators need to change the way they teach, and amid this need, active methodologies are emerging. Among them, gamification has stood out as a trend in health education², already showing benefits in areas such as radiology, surgery, clinical medicine, dermatology, pathology, geriatrics, and even in reducing the use of jargon by medical students.

Gamification is defined as the use of game design elements in “non-game” contexts, with the aim of increasing engagement, motivation, and learning in the contexts in which they are applied³. These elements can be exemplified by points, badges, progress bars, leaderboards, virtual currencies, and avatars⁴. It should be noted that although game elements are applied in educational contexts, they are not central to the learning process but rather perform a supporting role⁵.

There are many challenges in the medical education scenario. In the context of anatomy, students report that memorizing the large number of anatomical terms (many derived from Latin/Hellenic) is the factor that most hinders learning⁶, especially in the pandemic context, which has restricted practical activities essential to the three-dimensional understanding of structures⁷. In addition, there are high rates of dissatisfaction and insecurity, with students feeling unsure about their anatomical knowledge in terms of clinical applicability⁶. In the field of histology, students consider the subject extremely monotonous and the nomenclature very challenging, with many teachers in the area considering the reformulation of pedagogy important, for example, with gamification strategies to overcome such issues⁸. In this context, complementing passive teaching, gamification, with its playfulness that enables activities that simulate reality, helps to minimize such challenges.

These gamification strategies have a transformative effect by arousing emotion and fun in a markedly stressful context, in addition to motivating them⁹. If designed properly, they promote greater student engagement through the progression of activities that gradually increase in difficulty and through motivational mechanisms, such as leaderboards and badges, having a positive impact on students' critical and creative thinking¹⁰. Furthermore, they offer both cognitive and emotional benefits, as they build student resilience and reframe the concept of failure, which becomes a necessary part of learning and makes rapid feedback cycles compatible with the instant gratification they experience in the digital world¹¹. In addition, such dynamics can promote healthy competition among students, which tends to stimulate and increase student performance¹².

One possible explanation for these benefits is found in Self-Determination Theory (SDT), which divides motivation into intrinsic and extrinsic. The former involves performing activities because people find them interesting and feel satisfaction in their performance, while the latter involves people being motivated by external factors, such as rewards or punishments, but the action itself does not satisfy them¹³. In the context of gamification, the theory suggests that the application of such strategies awakens “intrinsic motivation” in students, where they begin to value and enjoy their studies and overcome demotivation or purely extrinsic motivation¹⁴.

Despite the theoretical basis behind the technique, there is still no robust evidence to support the effectiveness of this approach. A 2024 study involving the application of three gamified hepatology modules in medical students compared the differences through pre-test and post-test scores between the groups that used the gamification strategy and those that did not¹⁵. There was a statistically significant increase in scores using the technique in the jaundice and anatomy modules, in addition to revealing greater knowledge retention and interest in the area studied¹⁵. With this, we can consider this method promising.

A study that addressed the use of badges as documentation of achievements or skills acquired in the medical field was found, but it was conducted in India, with sociodemographic and cultural conditions very different from those in Brazil and restricted to the field of anatomy¹⁶. Therefore, the present study can be considered innovative and unprecedented, as it addresses the use of emblems in the field of anatomy and histology, in addition to being able to more closely represent this type of approach in the Brazilian reality.

Teaching techniques that motivate students in the study of human anatomy and histology were highly sought after by the teaching assistants of the 1st and 2nd semesters linked to a philanthropic medical school. Understanding that gamification strategies have proven capable of overcoming many of the difficulties related to teaching this content, they were implemented in the *Ambiente Virtual de Aprendizagem* – AVA (Virtual Learning Environment), a virtual learning environment, for first-semester teaching assistantship students through the use of badges to encourage and motivate students. The badges were awarded to students as they completed the activities proposed in the AVA and according to their attendance at tutoring sessions on topics related to the theme of the week. At the end of the semester, a sticker album with all the badges acquired was created by the students and used as an evaluation method, stimulating more intense commitment to their studies and the pursuit of knowledge.

The objective of this study is to describe how gamification strategies were implemented through the use of badges as documentation of skills acquired by first- and second-semester medical students in the context of the transition from face-to-face to online activities in a human anatomy and histology tutoring program linked to Escola Bahiana de Medicina e Saúde Pública (EBMSP), with a focus on minimizing challenges in teaching and learning in these areas. In addition, it aims to present the experience from the perspective of the students and tutors who went through this experience.

2. Method

This article is a descriptive study with a qualitative approach, in the form of an experience report, experienced by students in the undergraduate Medicine course at the Escola Bahiana de Medicina e Saúde Pública (EBMSP) in an anatomy and histology tutoring program. The students' perceptions of the experience were collected based on interviews and informal observations, reported during weekly meetings.

2.1 Ethical aspects

This experience report complied with the ethical principles of Resolution nº 510/2016 of the Conselho Nacional de Saúde (Brazil), which governs research in the humanities and social sciences. As it did not involve the collection of sensitive data, direct identification of participants, or intervention on the human body, the study is exempt from submission to the Research Ethics Committee, as provided for in the same resolution.

All information collected was treated with confidentiality and anonymity. No identifiable personal data was recorded or disclosed. Formal measures to protect anonymity were adopted, such as the omission of names and the reporting of experiences described in an aggregated and generic manner, preserving the identity of those involved and avoiding any possibility of individual identification.

2.2 Monitoring operation

The monitoring is linked to the Metodologia Instrumental - MI (Instrumental Methodology) course and the Laboratório Morfofuncional - LMF (Morphofunctional Laboratory), located at the same institution. The LMF is a self-learning space that provides students with the necessary tools to study morphofunctional sciences in the fields of anatomy, histology, embryology, and physiology. The monitoring activities covered the first and second semesters,

with the portion responsible for teaching activities in the first semester, composed of 150 students, having 10 monitors (from the third semester of medicine at the institution), three student supervisors (from the institution's fifth semester of medicine), one general student supervisor (from the institution's eleventh semester of medicine), one teaching supervisor, responsible for making corrections and answering questions from the monitors, and one teaching coordinator (assistant professor at the faculty).

Until the first semester of 2020, gamification methods were used in tutoring activities through the use of *GCMoneys*. *GCMoneys* consisted of a fictitious currency that was obtained by students through participation in various tutoring activities, such as attendance at weekly meetings, completion of proposed activities, and participation in scientific sessions held by the tutoring program. Each student received a *GCMCard*, a paper card with spaces to stick the fictitious coins, the *GCMoneys*. The accumulation of *GCMoneys* could be converted into benefits for students, such as participation in simulations and academic events exclusive to the monitoring program.

2.3 Adaptation of monitoring activities and gamification strategies to the pandemic context

In the second half of 2020, due to the suspension of in-person activities at the medical school as a result of the COVID-19 pandemic, the tutoring program began to conduct its activities remotely. The weekly meetings between tutors and students, called Tutoria Jr., took place on the Zoom Meetings videoconferencing platform on Wednesdays, starting at 2 p.m. Tutoria Jr. was attended by five tutors and 75 students, as well as a teacher, who explained the subjects studied through questions and the active participation of the students. In addition, in the AVA, a virtual learning environment which students can access via the college's institutional email, some activities related to the content covered during the week were proposed: *GCMapa*, *Estudo com Peças*, and questionnaires from the video lessons available on the AVA.

GCMapa consists of an interactive study guide, developed using the H5P tool, which students were required to complete weekly after the Tutoria Jr. meeting. The *Estudo com Peças*, in turn, was an interactive activity, also developed using the H5P tool, in which images of cadaver parts obtained

from the book "Human Anatomy: Photographic Atlas of Systemic and Regional Anatomy" were used, related to the topics covered during the week, and should be completed weekly by the student. The *Estudo com Peças* required students to identify anatomical structures studied during the week, allowing them to have a learning experience closer to reality, a fundamental element during the period of suspension of face-to-face activities. Traditional and interactive video lessons related to the topics covered during the week were also made available on the AVA. After viewing the video lessons, a questionnaire with questions related to the topics covered was also released on the AVA. Unlike *Estudo com Peças* and *GCMapa*, which had to be submitted by Friday of the respective week, the questionnaires related to the video lessons could be completed at any time during the semester by the student. There were also four mock exams during the semester, covering all the content previously seen by the students, containing 12 multiple-choice questions and lasting a maximum of 40 minutes. The mock exams were made available on Monday, and students could answer them until 11:55 p.m. on Thursday. All materials used in the activities proposed by the tutoring program, including mock exam questions and quizzes, the creation of the *Estudo com Peças*, and the *GCMapa*, were developed by the tutors and reviewed by the tutoring supervisors. The correction and scoring of the activities were performed automatically by the AVA platform.

With the end of in-person activities, the previously planned *GCMoneys* system became unfeasible. Seeking other forms of gamification to encourage student participation in tutoring activities, a gamification system was implemented through the use of badges, the *GCMinis*, used as a way to represent the acquisition of a specific skill and/or knowledge. The general student supervisor was responsible for designing the *GCMinis*. These badges were awarded to students when they participated in certain tutoring-related activities, with each activity corresponding to a specific type of *GCMini*, as shown in Figure 1. Each type had an associated value, as described in Table 1. The Normal *GCMini* is awarded to students upon completion of the video lesson questionnaire and the "Study with Parts" activity, requiring a score of 50% in the latter activity, and is worth 0.2 (two tenths) points. The Golden *GCMini* is awarded upon completion of the *GCMapa* and is worth 0.3 (three tenths) points.

The *GCMoni* (the term comes from the combination of the words GCM and monitors) is awarded according to the student's attendance at the Tutoria Jr. of the week and is worth 0.5 (five tenths) points. The Silver *GCMini* is awarded for completing the mock exams and is worth 0.1 (one tenth) point. Automatically after completing the activities necessary to acquire the sticker, the student received a notification via the AVA informing them that it was Available on the platform for download in image format. In addition, students also received a similar notification via institutional email.

Table 1. Correspondence between *GCMinis*, tutoring activities, and their respective values

<i>GCMini</i>	Activity	Value
Normal <i>GCMini</i>	<i>Estudo com Peças</i> and Questionnaires	0.2
Gold <i>GCMini</i>	<i>GCMapa</i>	0.3
<i>GCMoni</i>	Attendance in Tutoria Jr.	0.5
Silver <i>GCMini</i>	Simulation	0.1

Source: the authors (2025).

Figure 1. Types of *GCMinis* available



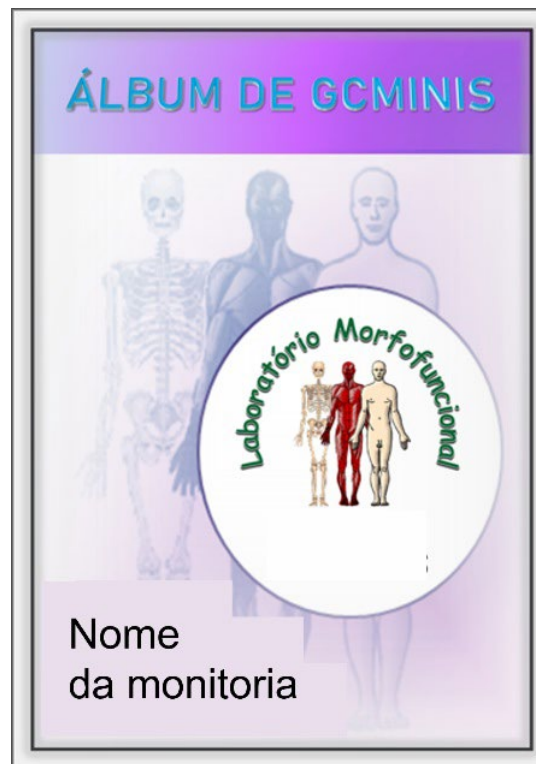
Source: authors' personal archive.

At the end of the semester and the tutoring activities, a virtual sticker album was provided to students, as shown in Figure 2 and Figure 3. The sticker album is an editable Word file with blank spaces, in which students should arrange and virtually fit the images of the *GCMinis* collected during the semester. Once the sticker album was filled, it had to be posted in an appropriate space on the AVA. The album was given a grade, which consisted of the sum of the values corresponding to each *GCMini* (Table 1). Student participation in all activities resulted in a total of 10 points. Some students could exceed the sum of 10 points, since the Silver *GCMinis*, obtained through the mock exam, were “extra points,” meaning that students could total 10 points even without taking the mock exams. If students exceeded 10 points, the excess points were not counted.

The grade assigned to the sticker album was used as an assessment method in the MI course, which is linked to tutoring. The sticker album was assessed by the general student supervisor of the tutoring program and accounted for 10% of the MI grade for the semester.

Considering that the primary objective of the strategy was to overcome barriers in teaching and learning, offering an incentive to seek the acquisition of available skills, and that the score was minimal, totaling 1 point out of 10 on average for the subject, there was no control to prevent fraud in the counting of badges. Therefore, upon presentation of the album at the end of the semester, the student received a proportional grade.

Figure 2. The cover of the sticker album used by students



Source: authors' personal archive.

Figure 3. Page from the sticker album specifically for the cardiovascular module to be completed by students



Source: authors' personal archive.

3. Discussion

The tutoring program sought to adapt to the new pandemic reality imposed by the suspension of face-to-face classes, implementing new gamification strategies to ensure a better learning environment. Thus, after the student had completed a series of activities fundamental to the consolidation of learning, he was rewarded with a badge, encouraging him in a playful way to seek knowledge. According to McCoy L., gamification strategies are capable of inducing excitement and fun in a stressful environment¹⁷, such as medical school. This same thought was reported by the students, as the experience was considered fun, even activating memories from their own childhood and evoking different positive emotions. Other qualitative impact indicators were also recorded, such as spontaneous reports of greater interest in histology and anatomy, continued student participation over the following weeks, and reports from some monitors regarding improved student engagement during weekly meetings after the gamified intervention.

Recent meta-analyses reinforce these findings, such as in 2024 when it was identified among nursing students that the use of educational games significantly improved students' academic motivation and self-confidence¹⁸. The positive emotions aroused by gamification, such as enthusiasm, pride, confidence, and reduced anxiety and demotivation during classes and tests¹⁹, many of which were described by the students who participated in this study, can make learning more interesting, students more active, and teachers more proactive in teaching, facilitating learning, which can extend to other areas of health, such as medicine.

The reports provided by students and monitors that show greater student engagement and persistence are broadly related and can be explained by "Self-Determination Theory" (SDT), which understands motivation as a spectrum that varies from extrinsic to intrinsic, supported by the basic needs of autonomy,

competence, and belonging², all of which are also addressed through gamified approaches. However, some negative comments were also made by some students regarding the completion of the sticker album, reporting that the activity was quite time-consuming when compared to other tasks. In addition, the deadline for certain activities was considered insufficient for some students, who were unable to complete them within the stipulated time frame.

A pilot scientific study published in 2024 compared knowledge of physiology and biochemistry between two groups of 12 medical students each. One group received a lecture on the topic of "Vitamins," and the other learned about the same topic using "CARBGAME," a board game with questions on the subject. At the end, everyone took a test, in which the second group performed better with a statistically significant difference compared to the first²⁰. Thus, knowing that physiology and biochemistry are subjects in the basic cycle and that playfulness plays an even more important role in the early years of college, as it is still a new and more rigorous environment compared to high school, the use of gamification strategies in subjects such as anatomy and histology, also areas of the basic cycle, tends to be promising.

This article presents a gamification strategy using badges in an original way. In the current literature, no records were found of studies using badges and sticker albums in the teaching of anatomy and histology as an assessment method applied to the Brazilian reality. Thus, the relevance of this study is evident in terms of disseminating new promising teaching strategies.

As for the limitations of the study, the theoretical framework for implementing gamification strategies in medical education, specifically the use of badges, is limited, with few studies available on this topic. In addition, due to the methodological limitations of the study, it is not possible to quantitatively measure the real impact of implementing *GCMinis* on the teaching-learning process and knowledge retention by students.

4. Conclusion

The *GCMinis* album proved to be a satisfactory method for encouraging medical students to learn anatomy and histology, understood as a way to motivate students to complete and acquire all the badges in the album. These students were encouraged to carry out the activities proposed in *AVA*, in addition to encouraging participation in weekly meetings with monitors, amplifying their learning methods. In this context, students gained a certain degree of autonomy in their studies, being able to choose the most effective method for their learning, moving away from the traditional method that values only lectures. As a result, the implementation of this teaching resource through tutoring has shown how innovations in medical education are necessary, allowing adaptations to new realities and new virtual resources, thus enabling a better experience for students and tutors during the teaching-learning process of subjects such as histology and human anatomy, but future investigative studies are needed to assess the extent of this impact.

Authors' contributions

The authors declared that they have made substantial contributions to the work in terms of research conception or design, data acquisition, analysis, or interpretation for the work, and drafting or critically revising it for relevant intellectual content. All authors approved the final version to be published and agree to take public responsibility for all aspects of the study.

Competing of interest

No financial, legal, or political conflicts involving third parties (government, private companies and foundations, etc.) have been declared for any aspect of the submitted work (including but not limited to grants and funding, advisory board membership, study design, manuscript preparation, statistical analysis, etc.).

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