

Exploring the use of social gamification during and after emergency remote teaching caused by Covid-19

José Rocha do Amaral Neto Wilk Oliveira, Juho Hamari Pasqueline Dantas, Isabelle Melo do Nascimento
Federal University of Paraíba *Tampere University* *Federal University of Paraíba*
João Pessoa, Brazil Tampere, Finland João Pessoa, Brazil
jose.rocha@dcx.ufpb.br {wilk.oliveira, juho.hamari}@tuni.fi {pasqueline.dantas, isabelle.melo}@dcx.ufpb.br

Abstract—The Covid-19 pandemic has impacted the world population in several ways. Schools had to modify their teaching methods, reinventing pedagogical practices and actions to students to continue learning in a new teaching and learning routine. In particular, gameful approaches (*e.g.*, games, gamification, and simulators) were alternatives used to improve the quality of emergency remote teaching. However, the need to use these approaches on an emergency basis meant that institutions could not plan the application or analyze the impacts of these technologies. To fill this gap, we performed a qualitative study, in which four students and a teacher participated. Using thematic analysis, we explored their perception regarding the use of social gamification in emergency remote teaching compared to regular face-to-face teaching. The results indicate that some different gamification elements drew the attention of students during remote and face-to-face teaching. However, no differences were identified between the different teaching modalities. Our study contributes to the fields of educational technologies and gamification through insights into the application of social gamification in education.

Index Terms—gamified education, social gamification, emergency remote teaching, covid-19, thematic analysis

I. INTRODUCTION

As a result of the Covid-19 pandemic and the need for educational institutions to find a teaching-learning model during the pandemic [1], emergency remote teaching emerged as an alternative to maintaining the continuity of activities in educational institutions, as a means of maintaining the interaction between teachers, students, and employees remotely [2]. However, the change in teaching modality meant that teachers needed to adapt educational models [3]. As a result, different agents (*e.g.*, teachers, principals, and researchers) were looking for new solutions so that they could keep teachers and students motivated in this new scenario [4]. One of the widely used options to improve learning environments is gamification (*i.e.*,

This work has been supported by the Academy of Finland Flagship Programme [Grant No. 337653 - Forest-Human-Machine Interplay (UNITE)]. The authors would like to thank the company Eagle Soluções Educacionais e Tecnológicas Adaptativas Ltda./EAGLEEDU, for providing the system Eagle-edu free of charge for research purposes through the internal research collaboration project 2022/6202-3.1.

Wilk Oliveira is a managing partner of the company that commercializes the system Eagle-edu.

“the transformation of systems, services, and activities to provide motivational benefits as games often do” [5], [6]) in education [7], [8].

An emerging challenge was finding new solutions to engage and hold students’ attention during social isolation [9], [10], to increase social interaction between students and teachers, as well as the interaction between students themselves [11]. Affecting social interaction positively is one of the principles of gamification [12], making this methodology an important and useful tool during emergency remote teaching. Thus, especially social gamification emerges as a possibility to encourage social interaction between students and teachers, possibly making the teaching and learning process more efficient [13].

Therefore, to understand how social gamification is perceived in emergency remote teaching and regular face-to-face teaching, we conducted a qualitative study to explore the following research questions: **RQ1**: How does social gamification is perceived by students during emergency remote teaching? **RQ2**: How does social gamification is perceived by students during face-to-face teaching after the pandemic? **RQ3**? What are the differences between the perception of students and teachers in the use of social gamification during emergency remote teaching and face-to-face teaching after the pandemic?

II. STUDY DESIGN

In this study, we aimed to compare the students’ experience using social gamification during emergency remote teaching and post-pandemic face-to-face teaching. To achieve the objective, we conducted a qualitative study (based on thematic analysis [14]).

A. Materials and methods

To carry out the study, we used the platform Eagle-edu¹, a gamified educational system that allows teachers to create classes and apply activities (gamified or non-gamified). In addition, the system also allows gamification to be personalized based on the dimensions proposed by Toda *et al.* [15].

¹<https://eagle-edu.com.br/>

The platform was selected because it allows personalizing the system's gamification design, using social gamification, for example. The platform was personalized to be used with social gamification (*i.e.*, with the following gamification elements: social pressure, competition, cooperation, and reputation). The platform was provided free of charge for research purposes in the study.

To identify the profile of study participants (*i.e.*, students' user types), we used the Hexad scale composed of 24 questions, proposed by Tondello *et al.* [16]. As this is a study carried out with Portuguese speakers (from Brazil), the Brazilian-Portuguese version of the Hexad scale was used, which had its psychometric properties investigated by Santos *et al.* [17].

For data analysis, the software ATLAS.ti² was used. The software enables encoding and uniting such codes in different categories. In addition, the software enables the use of various types of research and the application of systematic and complex analysis strategies, making data generation more flexible.

The study was structured and carried out in three steps: *i) planning*, in which the number of weeks that the subject would be remote and face-to-face, *ii) execution*, with data collection through the Eagle-edu platform, in addition to two interviews, one carried out during the remote period and the other when returning to the face-to-face period, and *iii) analysis*, in which the data were analyzed to answer the RQ.

B. Participants and data analysis

19 undergraduate students attended classes, including one self-declared female and 18 self-declared males. Four students agreed to participate in the interviews, and those who signed a consent form had no prior knowledge of gamification. The class selection was made in agreement with the class professor, the participating students were those enrolled in the discipline of Applied Research to Computing.

The data collected in the semi-structured interviews were analyzed following thematic analysis [14]. The analysis was organized following the guidelines proposed by Braun and Clarke [14]: familiarization with the data, code generation, theme search, theme review, Define and name themes, and production of a report

III. RESULTS

The supplementary material related to the interview can be found in the appendix. All had only one dominant profile (*i.e.*, Hexad profile, which scores from 4 to 24, with the highest score), but also had profiles that were only one point away from the dominant profile. Concerning the first interview with the students, 10 sub-themes were obtained, which are organized into three main themes: "Gamification Elements", "Feeling" and "About the gamified system". The "gamification elements", instigated students, either with prizes, rankings, or competition. The "Feeling" theme, lists four codes, which are divided into positive feelings, such as relaxation towards discipline, motivation when receiving feedback, and

encouragement to make more effort and stay at the top of the ranking. However, also had a negative feeling about the ranking, the student was concerned about how it would be affecting the other docents if it would be generating some discouragement for being at the bottom of the table. Then, in "About Eagle-edu", only one code was obtained, which mentions encouraging students to try to carry out the activities correctly.

Subsequently, the interview was conducted after the end of the emergency remote teaching, which identified four codes, "Competition", "Recognition elements", "Negative feeling about the ranking" and "Positive feeling about the ranking", divided into two categories "Gamification Elements" and "Feeling".

In summary, regarding RQ1, most students had positive feelings, feeling motivated and encouraged. Finally, in the second round of interviews, the competition was the most cited code, in addition to recognition elements. Regarding RQ2, students continue to have the same opinions about the ranking, however, the desire for recognition for being at the top of it was added. Regarding RQ3, the teacher did not notice any difference between student performance during and after emergency remote teaching. Something to be highlighted is the position of each participant in the ranking, the ID 1 student was in 1st of the 19 participants, the ID 2 was in 18th, the ID 3 in 8th, and the ID 4 in 14th. It is noteworthy that all 19 students, except the one excluded due to attention issues, were considered in the ranking.

A. Discussion

At the end of December 2019, an outbreak of Covid-19 spread across the world. Devastatingly, it had a considerable impact on the world's population and led to changes in teaching methods. To address student motivation, we explored the use of social gamification during and after emergency remote teaching. Results showed both positive and negative impacts.

Student ID 1 expressed concern about the ranking, which he expressed in his first interview "*that ranking of best and worst, which I don't know if it's good or bad, like, the people who are in last place in the ranking, will it be will they feel unmotivated? And my concern*". In the second interview, he said "*Ranking, perhaps discouraging students*". This student has higher traits of Socialiser, Player, Philanthropist, and Achiever, who has as one of the elements of the suggested designs, social competition [18].

However, this student was the only one who was concerned about the ranking and motivation of the rest of his colleagues, which turns attention to the rest of his gamification designs, Achiever, Philanthropist, and Player, thus being able to associate such concern with the Philanthropist profile [19]. Or else in another speech in which he says that "*It would be interesting to be able to change the eagle's clothes*", being one of the suggested design elements of the Player profile.

The code with the highest frequency was "Competition" which was cited nine times, three times by student ID 2,

²<https://atlasti.com/pt>

who has Player and Achiever as the most salient traits, with speeches such as “[...] *competing is always good, seeing that you are not at the bottom*”. As a suggested profile design, interest in leaderboards, which matches their most salient traits [18], [19]. The other student who cited this code, was ID 3, six times, twice in the remote and four times in the face-to-face period, having the same case cited above, in which the most salient trait, Philanthropist, does not match the suggested design [19], however, with a point of difference for the Socialiser. The speeches of the ID 4 student did not make sense for the study, for this reason, it was not cited.

B. Limitations

Only four students consented to participate in the interviews. To mitigate this limitation, we chose to conduct a qualitative analysis using a robust data analysis technique (*i.e.*, thematic analysis), which is considered adequate to identify reliable results even with small samples. Even so, we did not reach a sufficient sample to saturate the codes [20]. Another limitation was the lack of female participants, which be able to create an imbalance in the analysis of the data obtained. In addition, the time of two weeks may have been short, and certain nuances of the experience of students and teachers may not have been identified. Therefore, our results may not be generalizable.

C. Lessons learned and recommendations for future studies

Initially, in this study, we explored the experiences of users, therefore, **we recommend that future work focuses on student performance**. In the study, social gamification was used, but there are other types of gamification design. So, **we recommend that future studies analyze other gamification designs**. Finally, we conducted the study with a small sample size (*i.e.*, four teachers and one professor) in a specific course/discipline. Thus, **we recommend that the study be replicated in other disciplines, with a larger sample, with comparisons between classes and different types of data analysis, being carried out in traditional teaching or in online disciplines**.

IV. CONCLUDING REMARKS

This paper discussed an experience of using social gamification, applied through a gamified educational platform, during the Covid-19 quarantine period and when returning to face-to-face activities, in which the student’s learning experience concerning social gamification was analyzed. The main results demonstrate that the application of social gamification can be beneficial to the teaching process, leading students to diversified standard classroom activity, thus renewing their interest in learning. On the other hand, contrary experiences about a gamification element were noticed. Finally, no differences were identified between the use of social gamification during and after emergency remote teaching.

APPENDIX

To access all supplementary material for this paper, visit the following link or request the authors: <https://osf.io/zhn7a>.

REFERENCES

- [1] M. A. Flores and A. Swennen, “The covid-19 pandemic and its effects on teacher education,” pp. 453–456, 2020.
- [2] M. Assunção Flores and M. Gago, “Teacher education in times of covid-19 pandemic in portugal: national, institutional and pedagogical responses,” *Journal of Education for Teaching*, vol. 46, no. 4, pp. 507–516, 2020.
- [3] C. B. Hodges, S. Moore, B. B. Lockee, T. Trust, and M. A. Bond, “The difference between emergency remote teaching and online learning,” *Educause Review*, 2020.
- [4] V. J. García-Morales, A. Garrido-Moreno, and R. Martín-Rojas, “The transformation of higher education after the covid disruption: Emerging challenges in an online learning scenario,” *Frontiers in Psychology*, vol. 12, p. 616059, 2021.
- [5] J. G. Hamari, G. Ritzer, and C. Rojek, “The blackwell encyclopedia of sociology,” 2019.
- [6] J. Koivisto and J. Hamari, “The rise of motivational information systems: A review of gamification research,” *International Journal of Information Management*, vol. 45, pp. 191–210, 2019.
- [7] M. Sailer and L. Homner, “The gamification of learning: A meta-analysis,” *Educational Psychology Review*, vol. 32, no. 1, pp. 77–112, 2020.
- [8] W. Oliveira, J. Hamari, L. Shi, A. M. Toda, L. Rodrigues, P. T. Palomino, and S. Isotani, “Tailored gamification in education: A literature review and future agenda,” *Education and Information Technologies*, pp. 1–34, 2022.
- [9] S. J. Daniel, “Education and the covid-19 pandemic,” *Prospects*, vol. 49, no. 1, pp. 91–96, 2020.
- [10] C. Azorín, “Beyond covid-19 supernova. is another education coming?” *Journal of Professional Capital and Community*, vol. 5, no. 3/4, pp. 381–390, 2020.
- [11] P. Tarkar, “Impact of covid-19 pandemic on education system,” *International Journal of Advanced Science and Technology*, vol. 29, no. 9, pp. 3812–3814, 2020.
- [12] J. Sánchez-Martín, F. Cañada-Cañada, and M. A. Dávila-Acedo, “Just a game? gamifying a general science class at university: Collaborative and competitive work implications,” *Thinking Skills and Creativity*, vol. 26, pp. 51–59, 2017.
- [13] M. Krause, M. Mogalle, H. Pohl, and J. J. Williams, “A playful game changer: Fostering student retention in online education with social gamification,” in *Proceedings of the Second (2015) ACM conference on Learning@ Scale*, 2015, pp. 95–102.
- [14] V. Braun and V. Clarke, “Using thematic analysis in psychology,” *Qualitative research in psychology*, vol. 3, no. 2, pp. 77–101, 2006.
- [15] A. M. Toda, W. Oliveira, A. C. Klock, P. T. Palomino, M. Pimenta, I. Gasparini, L. Shi, I. Bittencourt, S. Isotani, and A. I. Cristea, “A taxonomy of game elements for gamification in educational contexts: Proposal and evaluation,” in *2019 IEEE 19th International Conference on Advanced Learning Technologies (ICALT)*, vol. 2161. IEEE, 2019, pp. 84–88.
- [16] G. F. Tondello, A. Mora, A. Marczewski, and L. E. Nacke, “Empirical validation of the gamification user types hexad scale in english and spanish,” *International Journal of Human-Computer Studies*, vol. 127, pp. 95–111, 2019.
- [17] A. C. G. Santos, W. Oliveira, M. Altmeyer, J. Hamari, and S. Isotani, “Psychometric investigation of the gamification hexad user types scale in brazilian portuguese,” *Scientific reports*, vol. 12, no. 1, pp. 1–11, 2022.
- [18] G. F. Tondello, R. R. Wehbe, L. Diamond, M. Busch, A. Marczewski, and L. E. Nacke, “The gamification user types hexad scale,” in *Proceedings of the 2016 annual symposium on computer-human interaction in play*, 2016, pp. 229–243.
- [19] A. C. G. Santos, W. Oliveira, J. Hamari, L. Rodrigues, A. M. Toda, P. T. Palomino, and S. Isotani, “The relationship between user types and gamification designs,” *User modeling and user-adapted interaction*, vol. 31, no. 5, pp. 907–940, 2021.
- [20] M. M. Hennink, B. N. Kaiser, and V. C. Marconi, “Code saturation versus meaning saturation: how many interviews are enough?” *Qualitative health research*, vol. 27, no. 4, pp. 591–608, 2017.