Research article

Gamification on Instagram: Nursing students' degree of satisfaction with and perception of learning in an educational game

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ABSTRACT

Background: Gamification has been shown to lead to greater motivation and participation among students. Currently, many teachers use social networks to share supplementary course materials and student work, but they have not incorporated gamified educational activities into social networking sites.
Objective: To determine nursing students' satisfaction with an Instagram-based educational game and their perceptions of its effects on their learning.
Design: We conducted a cross-sectional, descriptive, observational study.
Participants: First-year nursing students in the subject "Dietetics and Nutrition".
Results: Of the total sample, 71.7 % agreed that gamification had helped them assimilate the content. Between 66 % and 70 % agreed that the experience had motivated them to keep up with the subject and learn more about the topic, that it had helped them to better understand certain concepts of the subject, that they would recommend the experience to other students, and that they enjoyed the experience of playing a game while learning. 71.7 % of them were in favour of increased use of gamification in other subjects.
Conclusions: The use of an Instagram-based educational game as a complement to in-class teaching was useful, enjoyable, and motivating for the acquisition of new knowledge.

1. Introduction

University teachers face the challenge of having to continuously adapt not only to socio-cultural changes but also to generational differences, as young people with new learning styles enter the university. Thus, teachers who seek to improve the acquisition of knowledge among their students are constantly searching for innovative educational modalities (Mackavey and Cron, 2019). Current university students have grown up in a rapidly-evolving digital world. This generation needs a change from the traditional educational model to one that includes new technologies (Stacey and Susan, 2016). One innovative educational modality is gamification, which is defined as the use of game elements in non-game contexts (Deterding et al., 2011). Another innovation is serious games, which are games about real-world topics that are designed primarily for educational purposes and whose primary objective is not entertainment (van Gaalen et al., 2021). These new educational tools draw on recreation to engage students and allow them to

compete and interact with each other (Stacey and Susan, 2016).

2. Background

Gamification has mostly been applied in educational contexts to solve two of the main problems faced by educators: lack of commitment and lack of motivation among students (Hamari et al., 2016). Another aspect of gamification is the intentional use of games to meet learning objectives, and its use in educational contexts as part of learning objectives is defined as game-based learning. Game-based learning has also been found to have a positive effect on student engagement (Wiggins, 2016).

This new learning approach has been used in various health science disciplines, as well as at different educational levels. The results have shown that gamification can be effective in promoting learning in different disciplines (Bharamgoudar, 2018; Gómez-Urquiza et al., 2019). For years, nursing students have engaged in gamified learning

when they participate in simulations that recreate real situations with the aim of improving the acquisition of skills, encouraging problem solving and facilitating the development of critical thinking (Mick, 2016; Strickland and Kaylor, 2016).

Gamification promotes learning through incentives or rewards linked to the concepts of the syllabus. Thus, gamification in nursing studies can motivate students, create a positive attitude toward learning and favour teamwork, since it encourages healthy competition among students, which stimulates the learning of the skills and competencies necessary to be future nursing professionals (Mick, 2016; Strickland and Kaylor, 2016; White and Shellenbarger, 2018).

2.1. The use of social media as an educational tool

Social media are a set of online digital platforms that allow users to create and exchange content. They are classified into collaborative projects (e.g., Wikipedia), microblogging services (e.g., Twitter), content communities (e.g., YouTube), social networking services (e.g., Facebook, Instagram), virtual games (e.g. SecondLife) and the so-called social worlds (e.g., the Metaverse) (Hamm et al., 2013; Vukušić Rukavina et al., 2021).

Because these platforms have an unprecedented capacity to reach potential users, they should be understood as useful tools for the education and training of health professionals, as well as for public health education (Chan and Leung, 2018; Vukušić Rukavina et al., 2021). Several authors have suggested that social networks can be used as learning platforms for future professionals, because they provide a virtual space in which students can share examples, questions, and experiences that favour training for future clinical practice (Goodyear et al., 2021; Hsieh et al., 2019).

Instagram is a social networking service that allows users to connect with each other by creating personal profiles and sending each other both public and private messages (Chan and Leung, 2018; Goodyear et al., 2021; Smailhodzic et al., 2016). Gamification has been studied mostly in the context of online question-and-answer platforms such as Kahoot (Castro et al., 2019; Coveney et al., 2022; Neureiter et al., 2020; Nordstien et al., 2017) or other approaches, such as the escape room (Anguas-Gracia et al., 2021; Dacanay et al., 2021; Gómez-Urquiza et al., 2019; Woodworth, 2021). Both social networking and gamification have proved effective in stimulating learning in the classroom. Although nursing educators have used social networking services as an educational tool, (Booth, 2015; Duke et al., 2017; Lopez & Cleary, 2018), to our knowledge, they have not used them to distribute a gamified activity.

Given the social cache of Instagram among young people and the already proven benefits of gamification in education, we decided to create an Instagram-based game to complement in-class activities of the subject "Dietetics and Nutrition" of the Bachelor of Nursing with the aim of improving students' learning process and motivation. The innovation of our approach is that it takes advantage of Instagram's popularity as a social networking site to distribute a gamified activity to students.

The objective of the present study was to determine students' perception of the influence that an Instagram-based game had on their learning and their satisfaction with this approach.

3. Method

We conducted a cross-sectional, descriptive, observational study. The study population was composed of students from the School of Nursing of the University of Barcelona (Spain) of the 2020–21 academic year. On the first day of class, all students enrolled in the subject "Dietetics and Nutrition" of the first year of the Nursing degree (n = 159) were invited to participate voluntarily in the Instagram game. Sampling was non-probabilistic and by convenience. The class was divided into two sections, each of which met in person once per week for 1 h and 30 min. Both sections of the subject were co-taught by Author 1 and Author

2.

The four-week educational game was designed expressly as a complement to in-class activities of "Dietetics and Nutrition", and it was hosted on an Instagram channel. The story of the game was set on the international space station, and the object was to give diet and nutrition tips to help the astronauts stationed there choose adequate food to undertake activities such as a spacewalk to repair the station. The game was only available for students enrolled in the subject who had created a new user account using their university identification number and had been accepted by the professor responsible for the channel. Students were not able to access the game from their personal Instagram account, if they had one.

To participate in the game, students answered a series of questions individually, as well as solved weekly challenges in self-organized groups of five or six members, about complex food-related topics. These challenges allowed them to earn points within the game. Standings were calculated both individually and by group and were posted within the game. The object was to achieve enough points in both the individual and the team competitions to become an astronaut-in-training.

3.1. Gamifying Instagram

Onboarding took place in class, using a video that introduced the game (https://www.youtube.com/watch?v=r4Anv42qbH0). Author 2 explained the mechanics and objectives of the game, and students created a new Instagram account and requested admission to the channel through an avatar.

Every day at 9 p.m., Author 1 launched a daily challenge consisting of two questions in an Instagram story, one related to that week's content and another one related both to aerospace science and to the week's topic. Both had to be answered individually. The questions were multiple choice, with four answer options, and students received instant feedback. The students had 24 h to answer the questions. Once the response period was over, Author 1 collected the results from the Instagram channel and published the daily leaderboard. A total of 40 questions were asked during the four-week game.

Another element of the game was the weekly challenge, which had to be tackled in a group. The weekly challenges addressed more complex situations, such as the energy and nutritional needs of an astronaut. Groups had to create an infographic with their answer and share it on Instagram. Unlike the answers to the questions, the infographic, when shared on the Instagram channel, could be seen by the rest of the participating students. In the face-to-face class, Author 2 shared the infographics with all students (whether or not they were participating in the game) with two objectives: to make visible the work done and to summarize what was learned during the previous session. A total of three weekly group challenges were performed.

Random challenges were also posed in each of the weeks, which consisted of sharing photographs of the participant's own diet. The rest of the participants could comment on them. With these activities, we intended to maintain interest in the channel, in addition to encouraging participation. This approach was well accepted by the participants. Participation was timid at the beginning and much more enthusiastic and creative at the end.

Participants could earn a maximum of 1100 experience points. For each correctly answered individual question, the participant earned 20 points, and the group weekly challenge had a maximum score of 100 points. In addition to the daily leaderboard, each week a list of overall individual and group scores was published. Progress bars let participants see how far they had advanced in the game.

To provide regular feedback, we used the tools of gamification and Instagram, such as "likes", scorecards, daily and weekly rankings, resharing the most noteworthy stories of the day, and messaging. All these tasks were performed by Author 1. Some were scheduled in advance, and some were performed in real time. Author 1 dedicated

approximately 8 h per week to the channel.

3.2. Data collection

We collected data using an ad hoc online satisfaction questionnaire created in the subject's Moodle platform. After the final exam for the subject "Dietetics and Nutrition", all students who participated in the Instagram game received an invitation by email in March 2021 to respond to the questionnaire, which they could only answer once. We collected the sociodemographic variables of sex and age. The questions were based on other questionnaires used in previous studies of gamification (Coveney et al., 2022; Gómez-Urquiza et al., 2019; San Martín-Rodríguez et al., 2020). The answers to the questions were on a four-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). Data collection was completed in April 2021.

3.3. Ethical considerations

Authors 1 and 2 were the subject's co-teachers. During the first class, Author 2 provided an oral explanation of the study to the students. He explained that participation was voluntary, that students could revoke their decision to participate at any time, and that participation (or lack thereof) would not affect their marks for the subject.

The questionnaire was carried out through the subject's Moodle platform. The first page of the questionnaire had an informed consent box. Students could proceed to the questions only after ticking the box.

The Instagram channel used was only open to students participating in the game. Students created a user account with their student identification number. While this number is not secret, using it meant that classmates and other Instagram users could not easily identify them. Another way in which we protected students' identity was to have them create a personal avatar to use in the game, rather than their own image or name.

Interaction on the channel always occurred outside of class time. Thus, its use did not interfere with classroom dynamics or negatively affect students who did not participate in the game.

4. Results

Of the 159 students enrolled in the first year of the Bachelor of Nursing, 143 participated in the game and 106 (74.13 % of participants) completed the questionnaire. The majority of these students, 90 (84.9 %) were women and 96 (90.6 %) were between 18 and 25 years old.

Table 1 shows the answers to the seven questions asked. In the last two columns of the table, we grouped the positive and negative assessments, respectively.

Of the 106 students who answered the questionnaire, 71.7 % agreed that participating had helped them learn the content and that participating in the daily and weekly challenges had helped them consolidate what they had learned in class. The same percentage of participants agreed that gamification should be used more in other subjects.

Of questionnaire respondents, 69.8 % agreed that they would recommend the experience to other students, and 67.9 % agreed that they had enjoyed themselves while learning. Similarly, 67.9 % agreed that the experience had motivated them to learn more about the topic and 66.0 % agreed that the experience had helped them better comprehend concepts from the subject.

5. Discussion

The majority of questionnaire respondents agreed that the Instagram-based game helped them consolidate their knowledge (71.7 %), that it helped them learn about the content of the subject (71.7 %), and that it helped them understand concepts from the subject (66 %). Similarly, San Martín-Rodríguez et al. (2020) evaluated satisfaction and knowledge acquisition after participating in a game on nursing theories and models, and the results showed that the integration of knowledge by students was highly satisfactory. Gutiérrez-Puertas et al. (2021) used an application to train nursing students in the basic techniques of cardiopulmonary resuscitation, showing that the level of knowledge after training was higher than among students who did not use the application. These results are in line with those of other studies that affirm that games encourage connections between theory and practice to aid students' comprehension of theory (Gu et al., 2022; Han et al., 2021).

Additionally, 71.7 % of the questionnaire respondents affirmed that

Table 1
Results of the satisfaction questionnaire.

	Strongly disagree	Disagree	Agree	Strongly agree	-	+
I think the game/Instagram channel has helped me learn about the content of the subject.	22 (20.8%)	8 (7.5 %)	34 (32.1 %)	42 (39.6 %)	30 (28.3 %)	76 (71.7 %)
I think that the Instagram channel/game used has helped me to better understand concepts of the subject.	20 (18.9 %)	16 (15.1 %)	28 (26.4 %)	42 (39.6 %)	36 (34.0 %)	70 (66.0 %)
Following the daily and weekly challenges has helped me to consolidate what I learned in class.	10 (9.4 %)	18 (18.9 %)	32 (35.8 %)	46 (35.8 %)	28 (28.3 %)	78 (71.7 %)
The experience has motivated me to keep up with the subject and learn more about the topic.	14 (13.2 %)	20 (18.9 %)	36 (34.0 %)	36 (34.0 %)	34 (32.1 %)	72 (67.9 %)
I am in favour of university studies using this approach (gamification) more in other subjects.	10 (9.4 %)	20 (18.9 %)	38 (35.8 %)	38 (35.8 %)	30 (28.3 %)	76 (71.7 %)
I would recommend this experience to other students.	18 (17.0 %)	14 (13.2 %)	38 (35.8 %)	36 (34 %)	32 (30.2 %)	74 (69.8 %)
I enjoyed playing a game while learning.	18 (17.0 %)	16 (15.1 %)	28 (26.4 %)	44 (41.5 %)	34 (32.1 %)	72 (67.9 %)

the use of daily and weekly challenges helped them consolidate what they learned in class. Other authors (Brull et al., 2017; Day-Black et al., 2015)have pointed out that current generations of students need strategies of active learning, stimulation, realism, and entertainment, as opposed to traditional readings and lectures. Similarly, our study agrees with that of Ferrer-Sargues et al. (2021), which shows that teamwork—a key competency—can be developed through online question platforms and that students evaluate this approach positively. Although Gallegos et al. (2017) state that the use of game-based learning platforms helps to engage students and improve their learning, it is also true that using specific platforms can increase both the cost and the learning curve for both designers and users. Using a specific game-based learning platform also carries the risk that the platform will cease to exist or stop being maintained. In this sense, using a popular and far-reaching social networking service such as Instagram can address the possible drawbacks of exclusive payment platforms.

In terms of motivation, 67.9 % of the survey respondents agreed that the experience had motivated them to keep up with the subject and to learn more. Anguas-Gracia et al. (2021) found a similarly positive attitude and an increase in interest and motivation in learning in a class that was gamified through an escape room. However, the use of Instagram has several advantages over the escape room, including the fact that it can be carried out continuously throughout the entire timeframe of a subject, students can choose when and to what extent to participate, and no in-class time is required. In this same line, Dembicki (2016) indicate that students liked gamification, in addition to finding that it increased their commitment to keep up with the subject.

Our respondents agreed that they would recommend the experience to their peers, in line with the results obtained in a review that evaluated the value of gamification in higher education of health science students (Arruzza and Chau, 2021). Other authors agree that gamification should be promoted in health-related university studies (Ferrer-Sargues et al., 2021; Gómez-Urquiza et al., 2019; Han et al., 2021; San Martín-Rodríguez et al., 2020).

Thus, gamification is effective in improving the knowledge, skills, and satisfaction of university students (Dacanay et al., 2021; Gentry et al., 2019; M, 2020; Min et al., 2022), making learning more attractive (Mackavey and Cron, 2019). In the same vein, we find other studies that show that students prefer gamification over learning without gamification, because gamification encourages enthusiasm, provides feedback, promotes goal-setting, and increases academic performance (Bai et al., 2020).

Regarding the enjoyment that gamification can generate in the student, our findings are aligned with those of other researchers (Gutiérrez-Puertas et al., 2021; Kubin, 2020). A recent systematic review (Arruzza and Chau, 2021) suggests that gamification may be advantageous for university health science students as it has a positive impact on their satisfaction. Ignacio and Chen (2020) show that gamified platforms such as Kahoot are an excellent way to learn and assimilate information in a fun and interactive way. Therefore, using Instagram, a network with a lot of social appeal for young people, can capitalise on the advantages of other gamified platforms without the possible disadvantages such as the additional cost or the need for synchronous use (which requires taking up class time).

5.1. Implications for using Instagram

Planning, preparing, executing, and tracking the Instagram channel takes considerable time. Although this can be a disadvantage, launching a teaching innovation such as this one is motivating and engaging for teachers because it brings them closer to students through current technology and complements more traditional activities. Further, once the channel has been launched, there are elements that can be reused in future terms. Finally, data extraction is greatly facilitated by commercially available tools.

5.2. Limitations

Most nursing students are female, making it difficult to draw conclusions about gender differences. The design of the questionnaire based on closed questions did not allow to us to collect information on the causes of disagreement with the approach that some students showed. Although the results show students' satisfaction with the Instagram-based game, the data presented do not allow us to draw conclusions about the effects on students' acquisition and retention of knowledge. Finally, students had to create an Instagram account to participate, meaning that there could have been a self-selection bias (people who dislike Instagram may have chosen not to participate).

5.3. Future lines of research

While gamification was received positively by a majority of respondents, further research should be done to identify if there are improvements in knowledge acquisition and retention when compared to traditional methods (Angela et al., 2020). We have conducted a controlled study to determine the effects on learning of this approach and are currently analyzing the results (Author 1 et al., in progress). Despite the benefits identified in this study, the associated dangers of using Instagram and mobile technology should also be investigated in terms of potential risks such as technology addiction, time management problems, and/or exposure to the negative effects of social networking.

6. Conclusions

Respondents affirmed that an Instagram-based educational game was useful in helping them to improve their understanding of concepts. They also agreed that they had enjoyed the experience and that it motivated them to learn more. Most students thought that gamification should be increased in university education. Instagram offers advantages such as easy, no-cost access, and it was well accepted by nursing students for the gamification of a university subject.

CRediT authorship contribution statement

Antonio Rosa-Castillo: Conceptualization, Methodology, Investigation, Writing– Original Draft, Writing– Review and Editing. **Oscar García-Pañella:** Conceptualization, Formal analysis. **Elena Maestre-Gonzalez:** Validation, Investigation. **Anna Pulpón-Segura:** Supervision, Writing– Original Draft, Writing– Review and Editing. **Alba Roselló-Novella:** Methodology, Visualization. **Montserrat Solà-Pola:** Supervision, Project administration, Writing– Original Draft, Writing– Review and Editing.

All authors meet the criteria for authorship and have approved the final manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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