

An evaluation of undergraduate student nurses' gameful experience while playing an escape room game as part of a community health nursing course

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ABSTRACT

Background: The integration of innovative strategies to teaching and learning in higher education, such as escape room games, can enhance the acquisition of key professional competencies including communication, teamwork and critical thinking.

Objectives: This study aimed to evaluate undergraduate student nurses' gameful experience while playing a escape room game as part of a nursing course.

Design: Cross-sectional descriptive study.

Participants: A total of 126 third year student nurses enrolled in the "Community Health Nursing II" course.

Method: The escape room game took place in a classroom at the Faculty of Health Ciencias. The measures included the GAMEX scale in its Spanish version and a self-reported questionnaire to evaluate the student's outcome of scape room game immediately after the end of the activity.

Results: The vast majority (99.21%) considered the escape room game to be an appropriate and an innovative teaching and learning strategy. The mean score for each of the GAMEX dimensions was over 3, with the exception of Absence of negative effects. Our results suggest that the students enjoyed playing the game (mean=4.40; SD=0.71), that escape room games should be integrated in nursing courses(mean=4.54; SD=0.74) and that playing the game increased their motivation for learning (mean=3.06; SD=1.09). Gender differences were observed in the GAMEX Dominance dimension ($p<0.005$).

Conclusion: Gamification in general, and escape rooms in particular, have proven to be a valid tool for the acquisition of professional competencies in higher education.

Keywords: Nursing education; teaching; learning; students.

INTRODUCTION

The European Higher Education Area (EHEA) is a unique international collaboration on higher education (HE) that was brought about by the Bologna Process in 2010. Among other compromises, all the participating countries agreed to “implement a system of quality assurance to strengthen the quality and relevance of learning and teaching” (European Commission, 2018). Since then, much progress has been made in reforming HE systems across Europe. These changes have taken place at a macro level, through the introduction of the three-cycle HE system consisting of bachelor’s, master’s and doctoral studies and the mutual recognition of qualifications completed at other universities; at a meso level, through the rewriting of the former diploma and degree programs into bachelor’s studies and the reorganization of paths in academic careers (Kwiek and Antonowicz, 2015); and at a micro level, with the implementation of inclusive and innovative approaches to teaching and learning (T&L) that promote student participation in class activities.

Student participation in T&L activities requires both student and teacher commitment, and depends on a number of factors including student and teacher goals and expectations, teacher support, educational and motivational practices (Park, 2005; Turner and Patrick, 2004). Various strategies have been proposed to promote student participation and active learning in higher education, including problem-based learning (Sayyah et al., 2017), flipped learning (Greenwood and Mosca, 2017), and gamification (Day-Black et al., 2015; Veldkamp et al., 2020). When supported by information and communication technologies (ICT), these strategies can contribute to placing the students at the centre of their own learning (Aymes, 2012). More specifically, gamification can stimulate the students’ interest and motivation, increase peer-to-peer interaction and promote collaborative learning (Martín-Salinas and Cid-Galán, 2018).

BACKGROUND

Qualified nurses practice in a complex and dynamic environment which, sometimes, can be stressful and even hostile; they are often faced with rapidly evolving situations that require quick and clear-minded decision making. A traditional, more theoretical approach to case solving allows the students to learn content and identify possible solutions to real

life problems. However, this approach does not allow the students to experience real-life clinical problems and manage stress on a real-life time scale. In contrast, gamification in general, and escape rooms in particular, can help the students to consolidate knowledge, acquire new skills and develop specific attitudes in a controlled, virtual reality learning environment, and increase student motivation for learning (Gallegos et al., 2017; Kinio et al., 2019). More specifically, games have the potential to prepare new nurses for improved clinical decision making (Reed, 2020). According to Ferriz-Valero et al. (2020), gamification seems to improve learning experiences by improving certain variables, including extrinsic motivation, joyfulness, feedback, teamwork and active learning (Díaz-Ramírez, 2020). Further, this T&L strategy is beneficial for academic performance in higher education, even if the students' intrinsic motivation is not enhanced (Ferriz-Valero et al., 2020). Having said this, some disadvantages to gamification have also been cited in the literature, namely a wide variety of assessment and evaluation methods, which hinder researchers determining the true benefit and impact of games in higher education (Brown et al., 2018), as well as inherent limitations of gamification, including resource cost, varying student gaming experience/interest, logistical difficulties and lack of evidence of efficacy (Awan et al., 2019), which make games likely to be insufficient as standalone teaching methods.

Escape rooms are becoming increasingly popular in HE (Veldkamp et al., 2020). This form of experiential learning allows the students to learn by doing, that is, to experience a problem or a question and work out the right answer based on the decisions that they make. Learning through lived experiences is one of the most memorable and significant ways of learning (Soler et al., 2020) and allows the students to critically reflect on day-to-day, academic and clinical problems (Morales-Rodríguez, 2017). In fact, it has been suggested that the use of gamification in HE can improve the acquisition of knowledge, skills and attitudes, and promote critical thinking, thus improving student satisfaction and experience (Gómez-Urquiza et al., 2019).

Escape rooms are a “form of collaborative live-action gaming requiring students to solve clues to escape a locked room”, requiring problem solving skills, critical thinking, and teamwork (Morrell and Ball, 2020). In the context of nursing education and training, escape rooms allow the students to tackle and solve both physical and mental puzzles or tests, acquire key professional competencies, practice teamworking skills and to use

multiple intelligences to solve problems (Adams et al., 2018; Morrell and Ball, 2020). In addition, this T&L strategy provides immediate feedback (Márquez-Hernández et al., 2019; Morrell and Eukel, 2020) and allows for the application of theoretical content to practice through highly visual, experiential learning.

Community Health Nursing Course II is part of the Bachelor of Nursing curriculum at the University of Zaragoza (Zaragoza, Spain). Throughout this course, third year undergraduate student nurses analyse health problems derived from the environment, communicable and non-communicable diseases. This course's syllabus is based on the idea that environmental and/or social changes can generate health problems and, thus, increase healthcare demand. In order to meet these new or existing, yet increased, healthcare demand, nursing professionals must strive to constantly develop and adapt their practice to address the healthcare needs of the population. The lecturers implement a range of T&L strategies including lectures, seminars and workshops. Workshops in particular seek to integrate theoretical knowledge and knowing how to do, knowing how to be with and for the patient and his or her context, and knowing how to be (a nurse). This integrative learning process can be enhanced through gamification. In order to achieve this goal, we designed, implemented and evaluated a escape room T&L activity based on the establishment of a therapeutic relationship and the ability to provide individual and familiar therapeutic, preventative and health promotion interventions in the context of community healthcare. Therefore, the aim of this study was to evaluate undergraduate student nurses' gameful experience while playing a escape room game as part of a third year, community health nursing course. As secondary objectives, we evaluated the suitability of the escape room game to other subjects as well as its outcome.

METHOD

Design

We carried out a quantitative study with a cross-sectional design. The manuscript was written in accordance to the Strengthening the reporting of Observational Studies in Epidemiology (STROBE) protocol (Elm et al., 2007).

Participants and study location

Our target population were all the student nurses enrolled in the third year course Community Health Nursing II at the University of Zaragoza (N=134). We excluded all the student nurses who did not complete the escape room activity, and those who refused to give their informed consent to participate; 5 more students. We excluded 5 more participants who did not answer all the items or gave invalid answers. The final sample comprised a total of n=126 student nurses who met the selection criteria.

The escape room game took place in a classroom at the Faculty of Health Ciencias of the University of Zaragoza (see below for a detailed description of this activity). The students were divided into 12 groups of 10 and 1 group of 11 students, and were given 60 minutes to solve a case study. Each group of students completed the same escape room game once. Starting in October 2019 and finishing in December 2019, each week, two groups of students played the game during class hours. The evaluation of the activity took place immediately after exiting the room, either after successful completion or 60 minutes after entering the room, in the same classroom.

Description of the escape room game

The escape room game was designed by AA-G, Community Health Nursing II module co-ordinator, around a case study illustrating the effects of a stroke. The puzzles and tests were organised in such a way that one challenge led to the next. The story was projected on a screen in the classroom as the students kept completing the various puzzles and tests. The aim of the game was to identify five healthcare needs of the patient and his family at the time, and formulate two nursing diagnoses using a standardized nursing language. The following course learning outcomes were addressed by the escape room activity:

- 1) To identify health risks and determine different professional approaches, including referral to the multidisciplinary team.
- 2) To propose effective strategies to improve patient outcomes and quality of life through the collaboration with the health and social care teams, and the identification and use of family resources.
- 3) To design nursing care plans in collaboration with the patient and his or her main carer at home.

- 4) To recognise and interpret signs of deterioration, suffering, disability, health disorders, infection and chronic illness, and to measure the patients' level of autonomy to perform the activities of daily living.

The case started with a summary of the patient's clinical history and a phone call from the patient's daughter played through the sound system in the classroom. Throughout the course of the game, the students had to break a code to access the patient's full clinical history, complete a genogram, undertake an assessment of the patient and his relatives, identify 5 healthcare problems and 3 nursing needs, and formulate two nursing diagnoses. Once these tasks were completed, the door of the classroom was opened and the students were allowed to exit the room.

During the course of the game, while each group was in the room, the same subject teacher was also present to oversee the students' performance. This teacher did not give any assistance, but only spoke to confirm that a task had been completed correctly and the students were allowed to progress on to the next one.

Data collection

Immediately after the end of the activity, the students individually completed a survey comprising a short questionnaire of sociodemographic variables including age and sex, four ad hoc questions about the adequacy of the activity and the learning experience, the Gameful Experience Scale (GAMEX), four questions about the suitability of the game for other subjects and six questions about the outcome of the activity.

The four ad hoc questions about the adequacy of the activity and the learning experience comprised three dichotomous questions (yes/no answer) and an open-ended question:

1. Do you consider the escape room game to be an appropriate learning strategy for this course? (yes/no)
2. Do you think the escape room game is an innovative educational tool? (yes/no)
3. Had you ever played an escape room game as part of your learning before? (yes/no)
4. Do you have any comments or suggestions to improve this escape room game?
(open answer)

The GAMEX scale in its Spanish version was used to assess the students' experience (Márquez-Hernández et al., 2019). The scale was originally developed by Eppmann et al.

(2018) and comprises 27 items classified into 6 dimensions: 1) Enjoyment (items 1 to 6, Cronbach's $\alpha=0.96$), 2) Absorption (items 7 to 12, Cronbach's $\alpha=0.91$), 3) Creative thinking (items 13 to 16, Cronbach's $\alpha=0.88$), 4) Activation (items 17 to 20 Cronbach's $\alpha=0.87$), 5) Absence of negative effects (items 21 to 23 Cronbach's $\alpha=0.85$), and 6) Dominance (items 24 to 27 Cronbach's $\alpha=0.84$). Each item is measured on Likert-type scale ranging from 1 (never) to 5 (always). The Spanish version of the scale has good psychometric properties with good reliability and validity; Cronbach's α for the whole scale is 0.85, ranging from 0.79 to 0.89 for each separate dimension (Márquez-Hernández et al., 2019).

We evaluated the students' perception of the applicability of the escape room game to other subjects of the nursing programme through an additional dimension named "suitability for other subjects". This dimension comprised four items measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). These questions have been used to assess the suitability of a T&L activity in a similar previous study (Urcola-Pardo et al., 2018).

Finally, we included six questions based on a questionnaire used in previous studies (Gómez-Urquiza et al., 2019) in order to evaluate the outcome of the escape room activity. The responses to these questions were assessed on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Data analysis

A descriptive analysis was conducted, using frequencies and percentages for the qualitative variables, and means and standard deviation (SD) for the quantitative variables. The internal consistency of the GAMEX scale was calculated using the Cronbach's α value for each dimension and for the whole instrument. Finally, the differences between male and female students were analyzed using Mann-Whitney's U-test. All the analyses were conducted using IBM SPSS-22, applying a level of significance of $p<0.05$.

Ethical considerations

This study was authorized by the Department of Psychiatry and Nursing at the Faculty of Health Science of the University of Zaragoza, and it was approved by the Vicerrectorate

of Research (PIIDUZ_19_493). All of the students were informed about the aim and procedures of the study and were assured that participation was voluntary. The students were also informed that they could withdraw at any time without prejudice and without giving any reason.

RESULTS

A total sample of 126 student nurses participated in this study. The mean age of the participants was 20.73 years (SD 2.37) and the vast majority of our participants were female (85.7%).

With regard to the student nurses' perception of the adequacy of the activity, most of the participants (99.21%) considered the escape room game to be both an appropriate T&L strategy for the Community Health Nursing II course and an innovative educational strategy. Only 5 student nurses (3.97%) had played a escape room game as part of their learning before. With regard to their comments and suggestions to improve the escape room activity, 58 students (46.03%) would include better audiovisual and information technology resources, 39 students (30.95%) would place a large clock in the room to help them keep track of time during the activity, and would include more puzzles and challenges, 36 students (28.57%) thought that the time limit to exit the room and finish the game was insufficient, and 32 students (25.39%) suggested that the activity was extended to more classrooms and physical spaces. We have included a selection of the most representative, frequent and/or significant students' comments in Table 1.

Cronbach's alpha for the whole GAMEX instrument was 0.92, and ranged from 0.79 (Activation) to 0.91 (Enjoyment and Creative thinking) for each separate dimension (Table 2).

Insert Table 2 here

The results from the GAMEX questionnaire, the assessment of the suitability of the escape room game for other subjects and the evaluation of the outcome of the activity are presented in Table 3. The mean score for each of the GAMEX dimensions was over 3, with the exception of Absence of negative effects (mean=1.34; SD=0.65). With regard to the suitability of the escape room game for other subjects of the nursing programme, the students strongly agreed with the idea that this type of T&L is suitable for other subjects

(mean=4.47; SD=0.74), and that this type of educational strategy should be more prevalent in HE (mean=4.17; SD=0.80). In terms of the outcome, the students confirmed that they enjoyed playing the game (mean=4.40; SD=0.71) and that there should be more games of this type in nursing (mean=4.54; SD=0.74). In addition, they affirmed that playing the escape room game helped them learn the subject (mean=3.40; SD=0.96), allowed them to recall and apply theoretical knowledge of the subject (mean=4.02; SD=0.82), and made them feel motivated to further study (mean=3.06; SD=1.09). There were doubts with regard to the usefulness of the escape room game to pass the subject's final exam (mean=2.81; SD=0.99).

Insert Table 3 here

Gender differences were observed in the suitability of the escape room game for HE and the GAMEX Dominance dimension ($p < 0.005$). No significant gender differences were found in the other dimensions and items analyzed (Table 4).

Insert Table 4 here

DISCUSSION

This study evaluated students nurses' gameful experience while playing a escape room game as part of an undergraduate nursing course. In addition, we evaluated the escape room game's suitability for other subjects as well as its outcome. The vast majority of our participants were female (85.7%), reflecting the current female to male ratio in undergraduate nursing programmes in Spain (Limiñana-gras et al., 2013).

Recent investigations (Fernández-Hawrylak et al., 2020) confirm that escape room games can improve academic performance and the acquisition of emotional competencies in the context of HE. Whilst our results do not allow us to endorse this assertion, we can confirm that the student nurses' gameful experience was very positive. The student nurses enjoyed the playing the escape room game, allowing them to solve problems whilst using creative thinking skills. According to previous studies, escape rooms allow for the (re)creation of active learning environments that can make learning engaging and fun, and promote the use of important skills and abilities such as teamwork, critical thinking and problem solving (Adams et al., 2018; Strickland and Kaylor, 2016). Furthermore, our findings demonstrate that escape room games can help students recall and apply theoretical content

to a hypothetical case study in order to exit the room and finish the game. Some authors have suggested that this type of educational strategies allows the students to acquire and improve nursing skills and abilities (Adams et al., 2018; Strickland and Kaylor, 2016), which cannot be learnt through other more traditional, expositive T&L methodologies.

The student nurses confirmed that the escape room game could be applicable to other subjects in the undergraduate nursing programme. It is important to highlight that previous studies support the use of this tool in undergraduate health sciences programmes due to its versatility (Brown et al., 2019; del Blanco et al., 2017), but also in postgraduate nursing specialities including adult nursing (Gómez-Urquiza et al., 2019), child nursing (Kubin, 2020), cardiology nursing (Morrell and Ball, 2020) and women's health nursing (Edwards et al., 2019).

Although our students recommended that escape rooms are integrated into other undergraduate nursing courses, caution should be exercised when designing and implementing these strategies in nursing education. Namely, developing escape rooms with the purpose of training and education is a complex process that requires training and should be evaluated (Lewis et al., 2001).

Our results suggest that escape rooms' may not be exempt from negative effects. This is in agreement with a previous study (Soler et al., 2020) that found that escape room games may induce a high level of stress on the participants. Having said this, the benefits of integrating escape rooms in education do seem to outweigh the risks in this context (Pront et al., 2018).

When asked about the outcome, it was clear that most of the student nurses enjoyed playing the game. Our results match with those of previous similar investigations (Brown et al., 2019; Connelly et al., 2018; Gómez-Urquiza et al., 2019). As in previous studies (Davidson and Candy, 2016; Gallegos et al., 2017; Gómez-Urquiza et al., 2019), our students' motivation for learning increased whilst and after playing the game. Other advantages to this type of educational strategy include their relatively low cost (Olszewski and Wolbrink, 2017) and the use of new technologies, which millennial student nurses may find both attractive and motivating (Jambhekar et al., 2020).

According to Gil-Galván (2018), escape rooms can enhance student learning by promoting reflexive, sensitive and imaginative thinking in the HE context. Interestingly,

whilst our participants confirmed that playing the game contributed to their learning, they did not feel that playing the escape room would be useful to pass their exam. According to Biggs' theory of constructive alignment, teachers must focus on what the students do to learn and how that relates to teaching. Thus, when designing constructively aligned T&L activities and assessment tasks, teachers must clearly describe the intended learning outcomes, propose T&L activities based on what the student does and set assessment tasks that enable them to judge how well students' performances meet the criteria (Biggs and Tang, 2011). We argue that innovative educational strategies should be integrated into the study guide and assessed, either formatively, summatively or both. This may require the use of assessment models which are in agreement with the competencies acquired by the students during these activities.

No gender differences were found in the original GAMEX scale (Eppmann et al., 2018) and in similar previous studies (Gutiérrez-Puertas et al., 2020). However, our male student nurses achieved higher scores on the dominance dimension. According to Kouta and Kaite (2011), this may be due to differences in the self-perception of male nurses compared with female nurses. Often, male nurses consider themselves, and are considered by others, as leaders both in the performance of their role and while playing a game (González Calvo and Bernalte Benazet, 2011).

We did not investigate the impact of the escape room game on academic performance. Future studies in this area should address the impact of this and other innovative T&L tools and strategies on academic performance, as well as specific skills and competencies such as creativity, communication and teamwork. It would also be interesting to analyse the nursing teachers' perception of the design, implementation and integration of these T&L activities into the nursing courses and programmes.

Our experience of using an escape room game as part of an undergraduate nursing course was very positive. Gamification can transform pedagogical processes (Sanchez-Rodriguez et al., 2020) although it is still not prevalent in HE in our context. Our findings confirm that the escape room game is an innovative and motivating educational strategy that can be integrated into nursing education courses. Nursing educators should consider integrating this, and other innovative T&L tools and strategies in their class activities, thus making use of a combination of different teaching methods to enhance students' learning and motivation (Gomez-Urquiza et al., 2019).

Limitations

This study has some limitations that need to be acknowledged. First, we did not analyse the impact of the escape room game on academic performance. Furthermore, this T&L activity was not sumatively assessed at the time. Second, the GAMEX questionnaire is a relatively new instrument designed to measure users' gameful experience while using a service, which limits the possibility of comparing our results with those of previous studies. Finally, although we did ask the students not to discuss the escape room game with their peers after playing, we did not offer them a reward for exiting the room faster in order to discourage them from conferring with the rest of the groups. Thus, it is possible that some of the groups that played the game later had some previous information that allowed them to complete the tasks faster or more efficiently.

CONCLUSION

Escape room games can enhance student learning through the application of theoretical content to a case study. Other advantages include increased satisfaction with the learning experience, exposure to a degree of stress in a safe and controlled environment, practice and acquisition of practical skills and attitudes including communication, teamwork, creative thinking, active learning and absorption in the task in hand. Gamification in general, and escape rooms in particular, have proven to be a valid tool for the acquisition of professional competencies in HE. The application of this T&L strategy to other nursing courses and subject areas should be encouraged, and its impact on the students' learning experience and academic performance should be investigated.

REFERENCES

- Adams, V., Burger, S., Crawford, K., Setter, R., 2018. Can You Escape? Creating an Escape Room to Facilitate Active Learning. *J. Nurses Prof. Dev.* 34, E1. <https://doi.org/10.1097/NND.0000000000000433>
- Aymes, G.L., 2012. Pensamiento crítico en el aula. *Doc. e Inv.* 22, 41-60.
- Awan, O., Dey, C., Salts, H., Brian, J., Fotos, J., Royston, E., Braileanu, M., Ghobadi, E., Powell, J., Chung, C., & Auffermann, W., 2019. Making learning fun: Gaming in radiology education. *Acad. Radiol.* 26., 1127–1136. <https://doi.org/10.1016/j.acra.2019.02.020>
- Biggs, J.B., Tang, C.S., 2011. Teaching for quality learning at university: What the student does, 4. ed. McGraw-Hill, Society for Research into Higher Education & Open University Press, Maidenhead.
- Brown, C. L., Comunale, M. A., Wigdahl, B., Urdaneta-Hartmann, S., 2018. Current climate for digital game-based learning of science in further and higher education. *FEMS Microbiol. Lett.* 365, fny237. <https://doi.org/10.1093/femsle/fny237>
- Brown, N., Darby, W., Coronel, H., 2019. An Escape Room as a Simulation Teaching Strategy. *Clin. Simul. Nurs.* 30, 1–6. <https://doi.org/10.1016/j.ecns.2019.02.002>
- Connelly, L., Burbach, B.E., Kennedy, C., Walters, L., 2018. Escape Room Recruitment Event: Description and Lessons Learned. *J. Nurs. Educ.* 57, 184–187. <https://doi.org/10.3928/01484834-20180221-12>
- Davidson, S.J., Candy, L., 2016. Teaching EBP Using Game-Based Learning: Improving the Student Experience. *Worldviews Evid. Based Nurs.* 13, 285–293. <https://doi.org/10.1111/wvn.12152>
- Day-Black, C., Merrill, E.B., Konzelman, L., Williams, T.T., Hart, N., 2015. Gamification: An Innovative Teaching-Learning Strategy for the Digital Nursing Students in a Community Health Nursing Course. *ABNF J. Off. J. Assoc. Black Nurs. Fac. High. Educ. Inc* 26, 90–94.

- del Blanco, Á., Torrente, J., Fernández-Manjón, B., Ruiz, P., Giner, M., 2017. Using a videogame to facilitate nursing and medical students' first visit to the operating theatre. A randomized controlled trial. *Nurse Educ. Today* 55, 45–53. <https://doi.org/10.1016/j.nedt.2017.04.026>
- Díaz-Ramírez, J., 2020. Gamification in engineering education: An empirical assessment on learning and game performance. *Heliyon* 6, e04972. <https://doi.org/10.1016/j.heliyon.2020.e04972>
- Edwards, T., Boothby, J., Succheralli, L., 2019. Escape Room: Using an Innovative Teaching Strategy for Nursing Students Enrolled in a Maternity Clinical Course. *Teach. Learn. Nurs.* 14, 251–253. <https://doi.org/10.1016/j.teln.2019.05.001>
- Elm, E. von, Altman, D.G., Egger, M., Pocock, S.J., Gøtzsche, P.C., Vandenbroucke, J.P., 2007. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *The Lancet* 370, 1453–1457. [https://doi.org/10.1016/S0140-6736\(07\)61602-X](https://doi.org/10.1016/S0140-6736(07)61602-X)
- Eppmann, R., Bekk, M., Klein, K., 2018. Gameful Experience in Gamification: Construction and Validation of a Gameful Experience Scale [GAMEX]. *J. Interact. Mark.* 43, 98–115. <https://doi.org/10.1016/j.intmar.2018.03.002>
- European Commission, 2018. The Bologna Process and the European Higher Education Area [WWW Document]. *Educ. Train. - Eur. Comm.* URL https://ec.europa.eu/education/policies/higher-education/bologna-process-and-european-higher-education-area_en (accessed 2.18.21).
- Fernández-Hawrylak, M., Ibáñez, A.S., Sevilla, D.H., 2020. Las actividades de enseñanza-aprendizaje en el Espacio Europeo de Educación Superior: *Acad. Virtualidad* 13, 61–79. <https://doi.org/10.18359/ravi.4260>
- Ferriz-Valero, A., Østerlie, O., García-Martínez, S., García-Jaén, M., 2020. Gamification in physical education: Evaluation of impact on motivation and academic performance within Higher Education. *Int. J. Environ. Res. Public Health* 17, 124465. <https://doi.org/10.3390/ijerph17124465>

- Gallegos, C., Tesar, A.J., Connor, K., Martz, K., 2017. The use of a game-based learning platform to engage nursing students: A descriptive, qualitative study. *Nurse Educ. Pract.* 27, 101–106. <https://doi.org/10.1016/j.nepr.2017.08.019>
- Gómez-Urquiza, J.L., Gómez-Salgado, J., Albendín-García, L., Correa-Rodríguez, M., González-Jiménez, E., Cañadas-De la Fuente, G.A., 2019. The impact on nursing students' opinions and motivation of using a “Nursing Escape Room” as a teaching game: A descriptive study. *Nurse Educ. Today* 72, 73–76. <https://doi.org/10.1016/j.nedt.2018.10.018>
- González Calvo, L., Bernalte Benazet, Á., 2011. Las categorías de género vistas por los jóvenes universitarios de la Facultad de Enfermería de la Universidad de Cádiz. *Cult. Los Cuid.* 0, 47–56. <https://doi.org/10.7184/cuid.2011.29.06>
- Greenwood, V.A., Mosca, C., 2017. Flipping the Nursing Classroom Without Flipping Out the Students. *Nurs. Educ. Perspect.* 38, 342–343. <https://doi.org/10.1097/01.NEP.0000000000000167>
- Gutiérrez-Puertas, L., Márquez-Hernández, V.V., Román-López, P., Rodríguez-Arrastia, M.J., Ropero-Padilla, C., Molina-Torres, G., 2020. Escape Rooms as a Clinical Evaluation Method for Nursing Students. *Clin. Simul. Nurs.* 49, 73–80. <https://doi.org/10.1016/j.ecns.2020.05.010>
- Jambhekar, K., Pahls, R.P., Deloney, L.A., 2020. Benefits of an Escape Room as a Novel Educational Activity for Radiology Residents. *Acad. Radiol.* 27, 276–283. <https://doi.org/10.1016/j.acra.2019.04.021>
- Kinio, A.E., Dufresne, L., Brandys, T., Jetty, P., 2019. Break out of the Classroom: The Use of Escape Rooms as an Alternative Teaching Strategy in Surgical Education. *J. Surg. Educ.* 76, 134–139. <https://doi.org/10.1016/j.jsurg.2018.06.030>
- Kouta, C., Kaite, C.P., 2011. Gender Discrimination and Nursing: A Literature Review. *J. Prof. Nurs.* 27, 59–63. <https://doi.org/10.1016/j.profnurs.2010.10.006>
- Kubin, L., 2020. Using an Escape Activity in the Classroom to Enhance Nursing Student Learning. *Clin. Simul. Nurs.* 47, 52–56. <https://doi.org/10.1016/j.ecns.2020.07.007>

- Kwiek, M., Antonowicz, D., 2015. The Changing Paths in Academic Careers in European Universities: Minor Steps and Major Milestones, in: Fumasoli, T., Goastellec, G., Kehm, B.M. (Eds.), *Academic Work and Careers in Europe: Trends, Challenges, Perspectives, The Changing Academy – The Changing Academic Profession in International Comparative Perspective*. Springer International Publishing, Cham, pp. 41–68. https://doi.org/10.1007/978-3-319-10720-2_3
- Lewis, M.J., Davies, R., Jenkins, D., Tait, M.I., 2001. A review of evaluative studies of computer-based learning in nursing education. *Nurse Educ. Today* 21, 26–37. <https://doi.org/10.1054/nedt.2000.0494>
- Limiñana-gras, R.M., Sánchez-lópez, M.P., Román, A.I.S., Corbalán-berná, F.J., 2013. Health and Gender in Female-Dominated Occupations: The Case of Male Nurses. *J. Mens Stud.* 21, 135–148.
- Márquez-Hernández, V.V., Garrido-Molina, J.M., Gutiérrez-Puertas, L., García-Viola, A., Aguilera-Manrique, G., Granados-Gámez, G., 2019. How to measure gamification experiences in nursing? Adaptation and validation of the Gameful Experience Scale [GAMEX]. *Nurse Educ. Today* 81, 34–38. <https://doi.org/10.1016/j.nedt.2019.07.005>
- Martín-Salinas, C., Cid-Galán, M.L., 2018. Experiencia de aprendizaje cooperativo en una asignatura optativa del Grado en Enfermería. *Educ. Médica* 19, 288–293. <https://doi.org/10.1016/j.edumed.2017.10.035>
- Morales-Rodríguez, F.M., 2017. Estilos de aprendizaje y autoconcepto en universitarios. *Rev. Estud. E Investig. En Psicol. Educ.* 082–087. <https://doi.org/10.17979/reipe.2017.0.01.2264>
- Morrell, B.L.M., Ball, H.M., 2020. Can You Escape Nursing School? Educational Escape Room in Nursing Education. *Nurs. Educ. Perspect.* 41, 197–198. <https://doi.org/10.1097/01.NEP.0000000000000441>
- Morrell, B.L.M., Eukel, H.N., 2020. Escape the Generational Gap: A Cardiovascular Escape Room for Nursing Education. *J. Nurs. Educ.* 59, 111–115. <https://doi.org/10.3928/01484834-20200122-11>

- Olszewski, A.E., Wolbrink, T.A., 2017. Serious Gaming in Medical Education: A Proposed Structured Framework for Game Development. *Simul. Healthc.* 12, 240–253. <https://doi.org/10.1097/SIH.0000000000000212>
- Park, I., 2005. Teacher commitment and its effects on student achievement in American high schools. *Educ. Res. Eval.* 11, 461–485. <https://doi.org/10.1080/13803610500146269>
- Pront, L., Müller, A., Koschade, A., Hutton, A., 2018. Gaming in Nursing Education: A Literature Review. *Nurs. Educ. Perspect.* 39, 23–28. <https://doi.org/10.1097/01.NEP.0000000000000251>
- Reed, J.M., 2020. Gaming in Nursing Education: Recent Trends and Future Paths. *J Nurs Educ.* 59, 375-381. <https://doi.org/10.3928/01484834-20200617-04>
- Sanchez-Rodriguez, J., Colomo Magaña, E., Sanchez-Rivas, E., Ruiz-Palmero, J., 2020. La tecnología como eje del cambio metodológico. UMA editorial, Málaga.
- Sayyah, M., Shirbandi, K., Saki-Malehi, A., Rahim, F., 2017. <div>Use of a problem-based learning teaching model for undergraduate medical and nursing education: a systematic review and meta-analysis</div> [WWW Document]. *Adv. Med. Educ. Pract.* <https://doi.org/10.2147/AMEP.S143694>
- Soler, O.M., Aguayo-González, M., Gutiérrez, S.S.R., Pera, M.J., Leyva-Moral, J.M., 2020. Nursing Students' Expectations of their First Clinical Placement: A Qualitative Study. *Nurse Educ. Today* 104736. <https://doi.org/10.1016/j.nedt.2020.104736>
- Strickland, H.P., Kaylor, S.K., 2016. Bringing your a-game: Educational gaming for student success. *Nurse Educ. Today* 40, 101–103. <https://doi.org/10.1016/j.nedt.2016.02.014>
- Turner, J.C., Patrick, H., 2004. Motivational Influences on Student Participation in Classroom Learning Activities. *Teach. Coll. Rec.* 106, 1759–1785. <https://doi.org/10.1111/j.1467-9620.2004.00404.x>

Urcola-Pardo, F., Blázquez-Ornat, I., Anguas-Gracia, A., Gasch-Gallen, Á., Germán-Bes, C., 2018. Perceptions of nursing students after performing an individual activity designed to develop their critical thinking: The “critical card” tool. *Nurse Educ. Pract.* 29, 35–40. <https://doi.org/10.1016/j.nepr.2017.11.005>

Veldkamp, A., van de Grint, L., Knippels, M.-C.P.J., van Joolingen, W.R., 2020. Escape education: A systematic review on escape rooms in education. *Educ. Res. Rev.* 31, 100364. <https://doi.org/10.1016/j.edurev.2020.100364>