

Communicating Science Through Escape Rooms: A Challenge

Pedro Simão Mendes¹, Marília Prada¹ and Marta Ferreira Dias²

¹CIS-Iscte, Iscte-Instituto Universitário de Lisboa, Lisbon, Portugal

²GOVCOPP, DEGEIT, Universidade de Aveiro, Portugal

pedro.simao.mendes@iscte-iul.pt

marilia_prada@iscte-iul.pt

mfdias@ua.pt

Abstract: Existing evidence shows that escape rooms are effective in promoting learning, motivation, and engagement in educational and professional contexts. More recently, the format has been used in science communication initiatives in informal contexts and/or with diverse audiences, showing promising results. Despite these developments, the potential of escape rooms as structured tools for science communication remains significantly underexplored from an empirical perspective. This gap is particularly relevant in a context marked by misinformation, declining trust in science (European Commission, 2025), and growing demands for participatory communication formats. This context calls for prior empirical understanding of how different stakeholders perceive, evaluate, and relate to novel science communication tools such as escape rooms. Drawing from cognitive and social psychology, and science communication, this conceptual protocol addresses this critical empirical gap by examining how different stakeholders (potential users, academics, institutional decision-makers, and industry professionals) perceive, accept or resist the use of escape rooms as a science communication tool in Portugal. We propose a mixed-methods approach consisting of focus groups and an online questionnaire to assess openness or resistance to this format. We hypothesize that potential participants (e.g., university students, members of the public) would show strong interest in this format, but academics (professors and researchers, directors and deans) may show some resistance to its adoption. Insights from the escape room industry will complement the findings from this project, allowing us to map the barriers and opportunities for the engagement of diverse audiences with scientific content using escape rooms. The further goal is to inform future development of evidence-based escape rooms for science communication that encourage people's active participation in scientific discourse.

Keywords: Escape Rooms, Science communication, Attitudes, Mixed-methods

1. Introduction

Escape rooms are collaborative games with a specific goal (usually escaping from a room under a time limit) that involve solving puzzles and challenges (Nicholson, 2015). Over the past decade, this format has been used in educational settings with overall success in promoting people's engagement (Zhang et al., 2019), motivation (Sánchez-Martín et al., 2020), and learning (Walsh and Spence, 2018). Several reviews and meta-analyses showed that these positive impacts are observed across educational levels and contexts (Fotaris and Mastoras, 2019; López-Pernas, 2024; Veldkamp et al., 2020). However, educational escape rooms most likely fall short in providing the same level of enjoyment as traditional/commercial escape rooms due to their predefined learning goals and budget constraints (Veldkamp et al., 2020). Capitalizing the entertaining and immersive elements in the context of Science Communication (SciComm) would allow reaching new audiences, promoting learning outside the classroom.

The goals of SciComm include promoting people's awareness of science and positive attitudes towards science, fostering engagement with science, and aiming at the public understanding of its content, processes, and social factors (Burns, O'Connor and Stocklmayer, 2003). Escape rooms have already been used to communicate scientific content in informal learning settings, namely museums (Babazadeh, 2023) and scientific public outreach events (Hoxha et al., 2023). Nevertheless, Mathieson, Duca, and Roche (2026) recognized a significant lack of studies exploring escape rooms for SciComm, while providing evidence for their effectiveness, even among non-enthusiasts of science.

Considering the rapid spread of (mis)information (World Health Organization, 2020), a decline of trust in science (European Commission, 2025), and that SciComm evolved into more participatory, dialogical, and co-creative approaches (Burns, O'Connor and Stocklmayer, 2003), there is increasing interest in developing SciComm formats that actively engage audience rather than positioning them as passive recipients of information. Escape rooms could represent one such format, but little is known about how stakeholders perceive their use in SciComm.

We propose assessing the attitudes of different stakeholders (potential users, academics and institutional decision-makers, industry professionals) regarding the use of escape rooms for SciComm in Portugal. *Attitudes* (negative-positive range) consist of relatively stable assessments of objects, persons, groups, issues or concepts,

and are shaped by beliefs, emotions and past behaviors (American Psychological Association, 2018). Rather than evaluating learning outcomes after participation, this project focuses on stakeholder perceptions and institutional feasibility as a prerequisite for sustainable science communication escape room design. The goal is to map cognitive, emotional, and institutional aspects that shape how people accept or reject escape rooms for SciComm.

Specifically, the project addresses four research questions (RQ): 1) How do different stakeholder groups perceive escape room use for science communication?; 2) What opportunities, barriers, and design requirements do stakeholders identify for the development and implementation of science communication escape rooms?; 3) To what extent do people accept the use of escape rooms for science communication?; and 4) How is trust in science and scientists associated with attitudes toward and acceptance of escape rooms for science communication?

2. Method

We propose a mixed methods approach, with two empirical studies. First, an exploratory qualitative study to collect data on participants' openness toward the use of escape rooms for SciComm, gathering detailed information on aspects supporting their positions, addressing RQ1 and RQ2. Second, an online questionnaire to assess attitudes toward the format, relating to them with participants' trust in science and scientists, addressing RQ3 and RQ4. The qualitative phase will identify salient themes, barriers, and opportunities that will inform the development of the survey instrument used in the quantitative phase. Both studies will rely on participation of adults from the abovementioned stakeholder groups to examine: people's perception of escape rooms as a learning tool; people's motivations to engage with escape rooms for SciComm; perceived effectiveness/impact, barriers/challenges, and features/technologies that people consider important in an escape room; and people's preferred scientific topics to be explored in this format.

2.1 Qualitative Study

We will conduct focus groups (5-8 participants) with a moderator and an observer, using a semi-structured script that covers the abovementioned dimensions. To explore a wide range of perspectives, we estimate a sample size of about 60 participants, 20 from each stakeholder group (general public, academia, escape room industry), with data saturation guiding final numbers. Participants will be selected by their experience with escape rooms (this variable will be recorded to explore potential differences between participants with and without prior experience) and focus groups will be conducted in Lisbon (institution's facilities) and online (online meeting software) whenever required. Qualitative data will undergo reflexive thematic analysis (Braun and Clarke, 2019), through MAXQDA or similar software, to identify key themes and insights. Two researchers will analyze content, and ties will be resolved by a third researcher.

2.2 Quantitative Study

An online Likert-like survey will be developed (and pilot-tested) based on the qualitative findings, covering the attitude dimensions identified by participants (which may include perceived enjoyment, educational value, legitimacy, accessibility, implementation feasibility, acceptance of the format, and/or others), further exploring the relation between those attitudes, sociodemographic data, and trust in science and scientists (Portuguese version of the *TISS - Trust in Science and Scientists scale* (Breakwell, Jaspal, and Wright, 2023)). An a priori power analysis will be conducted to determine the minimum sample size required for the planned group comparisons and regression analyses. We anticipate recruiting approximately 600 participants to ensure adequate power and representation across stakeholder groups. Developed on Qualtrics, the online survey will be distributed by email to Portuguese universities and escape room businesses and shared through social media and other informal channels to reach diverse contexts. Collected data will be analyzed using JASP software through descriptive and inferential analyses examining group differences and associations between study variables.

3. Expected Results

While participants' experiences with escape rooms for learning and SciComm are overall positive (Mathieson, Duca, and Roche, 2026; Sánchez-Martín et al., 2020), most universities in several European countries prioritize institutional communication over SciComm (Entradas et al., 2023)., our hypotheses are: H1) potential users could have more positive attitudes towards escape rooms as SciComm tools than institutional stakeholders (academics and decision-makers); H2) institutional stakeholders would express greater concerns regarding educational legitimacy and resource allocation than potential users. Finally, we hypothesize that people's attitudes toward escape rooms use relate to their trust in science and scientists, H3): people with higher levels of trust could show

positive attitudes toward escape rooms because the contact with scientific information is positive regardless of format; or, people with higher levels of trust could show negative attitudes toward escape rooms because they could prefer more rigorous formats. Additionally, inputs from industry professionals will help to a) assess the feasibility of developing escape rooms; b) identify the resources and strategies needed for a successful implementation; and c) investigate openness/resistance to an academia-industry collaboration. Potential differences between stakeholder groups will be analyzed to find (mis)alignments across the abovementioned dimensions.

The results will be condensed in evidence-based guidelines for the development of escape rooms for SciComm that consider the needs of audiences and communicators.

4. In Conclusion

The vast use of escape rooms to educate people of all ages has been thriving from the classroom to informal contexts, including those for SciComm. While this trend is promising, the development of escape rooms for SciComm should follow evidence-based guidelines that reflect key stakeholder attitudes toward this format. This paper provides a conceptual protocol to produce those guidelines by integrating the perspectives of potential users, academics, and industry professionals and examining how those perspectives align. For researchers and practitioners in games-based learning, this work highlights the importance of addressing stakeholder perceptions and institutional legitimacy when transferring playful learning formats to science communication contexts. In addition to contributing to the literature in the field of SciComm, the guidelines resulting from the project would constitute a relevant contribution to the practical design of future escape rooms interventions in informal contexts.

Acknowledgements

This work was supported by national funds through FCT (refs. UID/03125/2025, UID/04058/2025, and 2024.9865.CEECIND) and results from a project proposal submitted for funding to FCT. We thank the anonymous reviewer for the crucial comments that improved this work.

Ethics Declaration: The project will be submitted to evaluation to host institution's Ethics Committee, following the GDPR laws and best practices of conducting studies with humans. Data collection will only begin after ethical approval.

AI Declaration: ChatGPT (OpenAI) was used to review the English grammar of the document and adjust the referencing style (i.e., from APA to Harvard style).

References

- American Psychological Association (2018) *Attitude*. In: *APA dictionary of psychology*. Available at: <https://dictionary.apa.org/attitude> (Accessed: 10 April 2026).
- Babazadeh, M. (2023) 'UnlockArt: cultural mediation at the museum through an augmented reality escape room', in *European Conference on Games Based Learning*, pp. 38–45. Academic Conferences International Limited. Available at: <https://doi.org/10.34190/ecgbl.17.1.1646>.
- Braun, V. and Clarke, V. (2019) 'Reflecting on reflexive thematic analysis', *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597. Available at: <https://doi.org/10.1080/2159676X.2019.1628806>.
- Breakwell, G.M., Jaspal, R. and Wright, D.B. (2023) 'Identity resilience, science mistrust, COVID-19 risk and fear predictors of vaccine positivity and vaccination likelihood: a survey of UK and Portuguese samples', *Journal of Health Psychology*, 28(8), pp. 747–759. Available at: <https://doi.org/10.1177/13591053231161891>.
- Burns, T.W., O'Connor, D.J. and Stocklmayer, S.M. (2003) 'Science communication: a contemporary definition', *Public Understanding of Science*, 12(2), pp. 183–202. Available at: <https://doi.org/10.1177/09636625030122004>.
- Entradas, M., Marcinkowski, F., Bauer, M.W. and Pellegrini, G. (2023) 'University central offices are moving away from doing towards facilitating science communication: a European cross-comparison', *PLoS ONE*, 18(10), e0290504. Available at: <https://doi.org/10.1371/journal.pone.0290504>.
- European Commission: Directorate-General for Communication (2025) *European citizens' knowledge and attitudes towards science and technology*. Publications Office of the European Union. Available at: <https://doi.org/10.2777/6040908>.
- Fotaris, P. and Mastoras, T. (2019) 'Escape rooms for learning: a systematic review', in Elbaek, L., Majgaard, G., Valente, A. and Khalid, S. (eds.) *Proceedings of the 13th International Conference on Game Based Learning*, pp. 235–243. Academic Conferences and Publishing International. Available at: https://www.researchgate.net/publication/336374954_Escape_Rooms_for_Learning_A_Systematic_Review (Accessed: 10 April 2026).
- Hoxha, I., Mudrik, N., Urai, A.E., Kienigiel, D., Forest, J., Abdelhack, M., Peters, M.A.K., Halper, N., Zhang, R., Lu, X., and Butler, J.S. (2023) 'Opening computational neuroscience to a wider audience: virtual escape room for kids', in

- Proceedings of the 2023 Conference on Cognitive Computational Neuroscience*, pp. 78–81. Available at: <https://discovery.ucl.ac.uk/id/eprint/10216064/1/0000078.pdf>.
- López-Pernas, S. (2024) 'Educational escape rooms are effective learning activities across educational levels and contexts: a meta-analysis', *IEEE Transactions on Learning Technologies*, 17, pp. 711–724. Available at: <https://doi.org/10.1109/TLT.2023.3328913>.
- Mathieson, A.J., Duca, E. and Roche, J. (2026) 'Back for the future: public engagement with climate science through a multimodal STEM escape room', *Journal of Science Communication*, 25(2), A06. Available at: <https://doi.org/10.22323/166920260106113122>.
- Nicholson, S. (2015) *Peeking behind the locked door: a survey of escape room facilities*. Available at: <https://scottnicholson.com/pubs/erfacwhite.pdf>.
- Sánchez-Martín, J., Corrales-Serrano, M., Luque-Sendra, A. and Zamora-Polo, F. (2020) 'Exit for success: gamifying science and technology for university students using escape-room. a preliminary approach', *Heliyon*, 6(7), e04340. Available at: <https://doi.org/10.1016/j.heliyon.2020.e04340>.
- Veldkamp, A., van de Grint, L., Knippels, M.P.J. and van Joolingen, W.R. (2020) 'Escape education: a systematic review on escape rooms in education', *Educational Research Review*, 31, 100364. Available at: <https://doi.org/10.1016/j.edurev.2020.100364>.
- Walsh, B. and Spence, M. (2018) 'Leveraging escape room popularity to provide first-year students with an introduction to engineering information', in *Proceedings of the Canadian Engineering Education Association (CEEA) Conference*, 3–6 June, Vancouver, BC. Available at: <https://doi.org/10.24908/pceea.v0i0.13054>.
- World Health Organization (2020) *Infodemic*. Available at: <https://www.who.int/health-topics/infodemic> (Accessed: 10 April 2026).
- Zhang, X.C., Diemer, G., Lee, H., Jaffe, R. and Papanagnou, D. (2019) 'Finding the "QR" to patient safety: applying gamification to incorporate patient safety priorities through a simulated "escape room" experience', *Cureus*, 11(2), e4014. Available at: <https://doi.org/10.7759/cureus.4014>.