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Letter to the Editor

Teaching children and adolescents basic life support using gamification



To the Editor,

Since the start of the COVID-19 pandemic, mass public events have been curtailed, including ones for teaching basic life support (BLS), like “World Restart a Heart Day”.¹ On September 24, 2021, during the “European researchers’ night”,² the University of Maribor, Faculty of Health Sciences (Slovenia), organized a public BLS-training for children and adolescents under strict COVID-19 infection precautions (e.g., proof of negative test, vaccination status, masks, social distancing and a 1:4 ratio of BLS instructors to learners). The aim was to safely teach potential lay rescuers the basics of BLS using a gamified experience.

Overall, more than 90 children and adolescents participated in this chest compression only BLS-training. The vast majority reported enjoying the training (70%), being interested in the content of the training (97%), would repeat the training in the future (91%), reported feeling competent doing chest compressions (87%), and think it is very important to know how to help in sudden cardiac arrest (95%). These findings were consistent with a previous study from 2018.³

Gamification, defined as “using game design elements in non-game contexts”,⁴ has been introduced into medical education⁵ to promote engagement using features like leaderboards, rewards, badges and avatars.⁶ We gamified the BLS-training by using the “Quality CardioPulmonary Resuscitation (QCPR) race” (Laerdal Medical, Stavanger, Norway). This “QCPR race” game mode is a part of the “QCPR Training” mobile application (available for Android and iOS), which connects “Little Anne QCPR” manikins through Bluetooth to visualize real-time chest compression or “30:2” cardiopulmonary resuscitation performance. “QCPR race” includes important gamification features, like time pressure, gaining rewards, leaderboard, trophies etc. (Fig. 1), which engage and motivate learners to optimize performance when competing with others.^{7,8} In the context of BLS-training, these features offer learners an attractive way to learn and practice hands-only chest compression, as accurate performance is required to win the race against other “players”. The more accurate a player performs chest compression, measured by “Little Anne QCPR” manikin, the faster the ambulance car advances on the screen towards the finish line of the game.

Manikin manufactures are now launching BLS-teaching products that include gamification features in order to engage more young people. The use of gamified manikins in public BLS-training events should be considered as it adds value to learning BLS for children, adolescents and adults, and might be a suitable alternative to standard BLS public-encounters. Setting up gamified public education events requires: 1) commercially available manikins, and 2) additional equipment (e.g., smartphones or tablets with specific mobile applications installed) that connect to a computer monitor display. The number of manikins available for the event will determine how many people can learn BLS using them, for instance, the “QCPR Training” mobile application and “Little Anne QCPR” manikins, can connect to six (for smartphone) or twelve (for tablet) learners. Six learners are the recommended size to teach adult BLS-training.⁹ Questions for further study include how long participants retain the skills, the costs and resources needed. Industry independent or open-resource solutions would be appreciated.¹⁰

Conflict of interest

RG is ERC Director of Guidelines and ILCOR, and ILCOR Task Force chair Education Implementation and Team. Other authors (NF, RMC, LG, GŠ and PS) declare that they have no conflict of interest.

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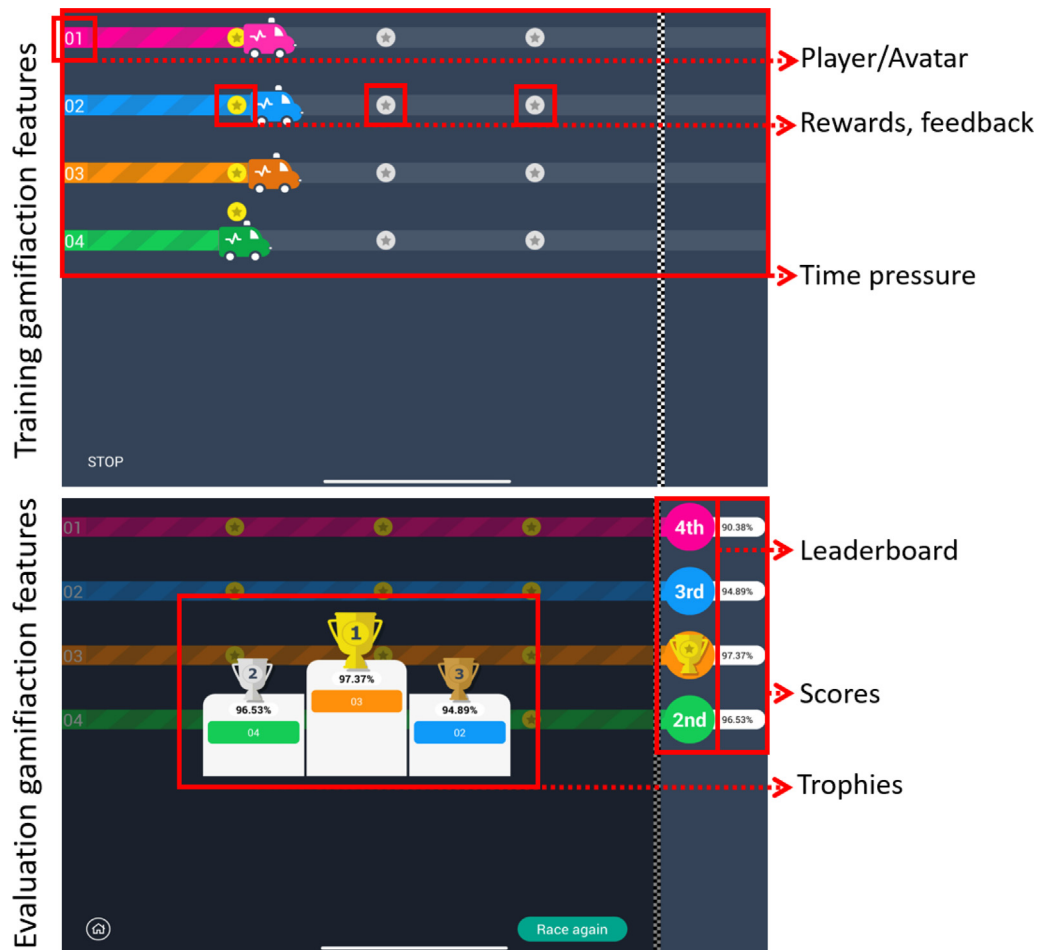


Fig. 1 – Gamification features in “QCPR race” (using Apple iPad Pro 2018 with installed “QCPR Training” mobile application version 4.13.3).

REFERENCES

- Böttiger BW, Lockey A, Aickin R, et al. “All citizens of the world can save a life”—The World Restart a Heart (WRAH) initiative starts in 2018. *Resuscitation* 2018;128:188–90.
- Marie Skłodowska-Curie Actions. Developing talents, advancing research. 2021 European Researchers’ Night. (Accessed 28 September 2021, at: <https://ec.europa.eu/research/mariecurieactions/event/2021-european-researchers-night>).
- Weidenauer D, Hamp T, Schrieffl C, et al. The impact of cardiopulmonary resuscitation (CPR) manikin chest stiffness on motivation and CPR performance measures in children undergoing CPR training - A prospective, randomized, single-blind, controlled trial. *PLoS One* 2018;13 e0202430.
- Deterding S, Dixon D, Khaled R, Nacke L. From game design elements to gamefulness: defining “gamification”. In: *MindTrek ’11: proceedings of the 15th international academic MindTrek conference: envisioning future media environments*. New York: Association for Computing Machinery; 2011. p. 9–15.
- Van Gaalen AEJ, Brouwer J, Schönrock-Adema J, et al. Gamification of health professions education: a systematic review. *Adv Health Sci Educ Theory Pract* 2021;26:683–711.
- Hainey T, Connolly TM, Boyle EA, et al. A systematic literature review of games-based learning empirical evidence in primary education. *Comput Edu* 2016;102:202–23.
- Fijačko N, Masterson Creber R, Gosak L, et al. Evaluating quality, usability, evidence-based content, and gamification features in mobile learning apps designed to teach children basic life support: systematic search in app stores and content analysis. *JMIR Mhealth Uhealth* 2021;9 e25437.
- Otero-Agra M, Barcala-Furelos R, Besada-Saavedra, et al. Let the kids play: gamification as a CPR training methodology in secondary school students. A quasi-experimental manikin simulation study. *Emerg Med J* 2019;36:653–9.
- Nabecker S, Huwendiek S, Theiler L, et al. The effective group size for teaching cardiopulmonary resuscitation skills – A randomized controlled simulation trial. *Resuscitation* 2021;165:77–82.
- Foohey S, Nagji A, Yilmaz Y, et al. Developing the virtual resus room: fidelity, usability, acceptability, and applicability of a virtual simulation for teaching and learning. *Acad Med*. 2021. <https://doi.org/10.1097/ACM.0000000000004364>. Online ahead of print

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