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Matching Game Genre with Lesson Content – A Development of Blood Circulation Racing Game
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Abstract
It has been demonstrated that students pay more attention during game-based learning, which in turn leads to greater levels of learning among students. In addition, the success of students in their academic endeavors is increased when the learning styles or learning objectives of the children are matched with the appropriate game type. This paper describes the development of a digital game for learning blood circulation that maps to a "racing" game genre. The lesson's objective was for the students to be able to understand how blood flows, and a racing game genre was chosen to match the lesson content. Racing game assets such as racetrack, race path, race car, and obstacles are mapped to lesson-embedded designs such as simplified blood circuit, blood direction, blood cells, and cholesterol lumps. Multiple cues are inserted into the game to help players with content recollections. Common challenges for racing games, such as time limits, energy meters, and obstacles, are tailored to the theme of blood circulation. Usability testing was conducted to measure the ease of use of this game using System Usability Scale (SUS). Five 15-year-old participants took part in the testing at a secondary school in Melaka. Participants were chosen using convenience sampling, and none of the participants had ever played the game before. A SUS standard score of 78 was obtained, which is considered "Good" under the Adjective Ratings when measured against the SUS Score Graph. © The Author(s) 2024.

Author Keywords
game design; game genre; game-based learning; usability testing

References

- Peters, L., Gagliano, S.
  19 '90s computer games that made learning unbelievably fun
  (2021) *Bustle*,
  Available

- Toda, A. M.
  A taxonomy of game elements for gamification in educational contexts: proposal and evaluation
  (2019) *2019 IEEE 19th Int. Conf. Adv. Learn. Technol. (ICALT)*, 2161, pp. 84-88.

- Sanchez-crespo, D., Dalmau, D. S. C.
  (2004) *Core Techniques and Algorithms in Game Programming: New Riders*,
  Indianapolis

- Rinaldi, R. E., Wihartono, M. T., Dharmalim, R. E., Suharjito, S.
  Serious game application development for learning battle of Surabaya
  (2022) *2022 Int. Conf. ICT Smart Soc. (ICISS)*, pp. 1-6.

- Babazadeh, M., Botturi, L., Reggiani, G.
  Let's Jazz: a case study on teaching music with educational escape rooms
  (2022) *Eur. Conf. Games Based Learn*, 16 (1), pp. 656-665.

- Plass, J. L., Homer, B. D., Kinzer, C. K.
  Foundations of game-based learning
  (2015) *Educ. Psychol*, 50 (4), pp. 258-283.

- Kessel, J.
  Let our children play: the importance of play in early childhood education
  (2018) *Univ. Montana J. Early Childhood Scholarship Innovat. Pract*, 2 (1), p. 5.

- Sabourin, J. L., Lester, J. C.
  Affect and engagement in game-based learning environments
  (2013) *IEEE Trans. Affect. Comput*, 5 (1), pp. 45-56.

- Sherry, J. L.
  Matching computer game genres to educational outcomes
  (2010) *Teaching and Learning with Technology*, pp. 234-246.
  (C. M. Stewart, C. C. Schifter, M. E. Markaridian Selverian (eds)). Routledge, New York

- Fu, K., Yuan, Y., Mai, E. L.-C., He, J.
  A systematic literature review to identify empirical evidence on the game design framework and model of games-based learning
  (2020) *Proc. 13th Eur. Conf. Game Based Learn*,

- Troiano, G. M.
  Exploring how game genre in student-designed games influences computational thinking development
  (2020) *Proc. 2020 CHI Conf. Hum. Fact. Comput. Syst*, pp. 1-17.

- Soska, A., Mottok, J., Wolff, C.
  Pattern oriented card game development: SOFTTY – A card game for academic learning of software testing
  (2017) *IEEE Global Eng. Educ. Conf., EDUCON*,

- Buchanan, L., Wolanczyk, F., Zinghini, F.
  Blending bloom's taxonomy and serious game design
  (2011) *Proc. Int. Conf. Secur. Manag. (SAM)*, p. 1.
  CSREA Press, Las Vegas, Nevada

- Ayyanathan, N.
  Learning analytics model and bloom's taxonomy based evaluation framework for the post graduate students' project assessment – a blended project based learning management system with rubric referenced predictors
  (2022) *Shanlax Int. J. Educ*, 10 (3).

- Abalkheel, A.
  Amalgamating bloom's taxonomy and artificial intelligence to face the challenges of online EFL learning amid post-covid-19 in Saudi Arabia
  (2021) *Int. J. Engl. Lang. Literat. Stud*, 11 (1).

- Filho, S. S. S., Bonacin, R.
  Best practices in WebQuest design: stimulating the higher levels of Bloom's taxonomy
  (2016) *Proc. – IEEE 16th Int. Conf. Adv. Learn. Technol., ICALT 2016*, pp. 391-395.

- Pelser-Carstens, V.
  Game based learning: a tabletop game approach to knowledge application and pervasive skill acquisition
  (2019) *EdMedia + Innovate Learning*, pp. 1148-1161.

- Rapeepisarn, K., Wong, K. W., Fung, C. C., Khine, M. S.
  The relationship between game genres, learning techniques and learning styles in educational computer games
  (2008) *Int. Conf. Tech. E-Learn. Digital Enter*, pp. 497-508.

- Dubreil, S.
  Using games for language learning in the age of social distancing

(2020) *Foreign Lang. Ann*, 53 (2), pp. 250-259.

- Yeat, G. W., Haziq, M., Teoh, N., Wei, C. K.
  (2019) *BIOLOGY FORM*, 4.
  (H. bin Hashim, S. F. binti M. Kamil, N. Teoh, T. W. Ling, C. K. Wei, and L. P. Kuan (eds)).
  Must Read Sdn. Bhd

- Pacheco, C., Tokarchuk, L., Pérez-Liébana, D.
  Studying believability assessment in racing games
  (2018) *Proc. 13th Int. Conf. Foundat. Digital Games*, pp. 1-10.

- Herder, T. M., Rau, M.
  The role of representational competencies for students' learning from an educational video game for astronomy
  (2022) *Front. Educ*,

- Annetta, L. A.
  The "I's" have it: a framework for serious educational game design
  (2010) *Rev. Gener. Psychol*,

- Abd Karim, S. R., Anwar, M. R., Jalaludin, S.
  (2020) *Sains Tahun 5 Sekolah Kebangsaan: Dewan Bahasa dan Pustaka*,

- Qi, K., Borland, D., Brunsen, E., Minogue, J., Peck, T. C.
  (2021) *The Impact of Prior Knowledge on the Effectiveness of Haptic and Visual Modalities for Teaching Forces*,
  Association for Computing Machinery, New York, NY

- dos Santos, A. L., Maurício, R. de A., Dayrell, M., Figueiredo, E.
  Exploring game elements in learning programming: an empirical evaluation
  (2018) *2018 IEEE Front. Educ. Conf. (FIE)*, pp. 1-9.

- Faulkner, L.
  Beyond the five-user assumption: benefits of increased sample sizes in usability testing
  (2003) *Behav. Res. Methods Instrum. Comput*,

- Lewis, J. D.
  Sample sizes for usability studies: additional considerations
  (1994) *Hum. Factors J. Hum. Factors Ergonom. Soc*,

- Nielsen, J.
  (2012) *How Many Test Users in a Usability Study?: Nielsen Norman Group*,
  Available

- Turner, C. W., Lewis, J. R., Nielsen, J.
  Determining usability test sample size
  (2006) *Int. Encycloped. Ergonom. Hum. Factors*, 3 (2), pp. 3084-3088.

- Brooke, J.
  SUS-A quick and dirty usability scale
  (1996) *Usabil. Eval. Ind*, 189 (194), pp. 4-7.

- Lewis, J. R.
  The system usability scale: past, present, and future
  (2018) *Int. J. Hum.–Comput. Interact*, 34 (7), pp. 577-590.

- Sauro, J.
  Measuring usability with the System Usability Scale (SUS)
  (2011) *Meas. U*,
  Available

- Bangor, A., Kortum, P., Miller, J.
  Determining what individual SUS scores mean: adding an adjective rating scale
  (2009) *J. Usabil. Studies*, 4 (3), pp. 114-123.

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