EDUCATIONAL GAMING

Educational gaming is the development of games purposefully designed to educate players and facilitate acquiring knowledge, learning skills and understanding subjects or concepts. Game-based teaching and learning has gradually become a pedagogical trend with growing attraction due to psychological needs and benefits of gaming, such as enjoyment, motivation, engagement, cognition, cooperation, and creativity. Gamification of teaching and learning has also been heatedly explored and discussed in recent years so as to achieve greater learning outcomes. This reading list contains over 50 publications over the past 5 years and aims to provide rich resources from various topical perspectives.

The Library will periodically add new resources to this list. Links to the full-text are indicated. If you encounter any problem in retrieving the materials, please contact library@sutd.edu.sg for assistance. Please also forward us titles that you would like to share with others in this list.

TOPICS

- **Overview**
- **Early Learning**
- **Game Design**
- **Learning Outcomes**
- **Makerspace**
- **STEM Education**

Overview

Selection of books and articles that offer a broad understanding of game-based pedagogy and gamification in today's classrooms

Crocco, F., Offenholley, K., & Hernandez, C. (2016). A proof-of-concept study of game-based learning in higher education. *Simulation & Gaming, 47*(4), 403-422. doi: 10.1177/1046878116632484

Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: A critical review. *International Journal of Educational Technology in Higher Education, 14*(9). doi: 10.1186/s41239-017-0042-5

Egenfeldt-Nielsen, S., Meyer, B., & Sørensen, B. H. (2011). *Serious games in education : A global perspective*. Santa Barbara: Aarhus University Press.

Kapp, K. M. (2012). *The gamification of learning and instruction : Game-based methods and strategies for training and education*. San Francisco: Pfeiffer. Available @ General Lending (LB1029 KAP)

Qian, M., & Clark, K. R. (2016). Game-based learning and 21st century skills: A review of recent research. *Computers in Human Behavior, 63*, 50-58. doi: 10.1016/j.chb.2016.05.023

Reiners, T., & Wood, L. C. (2015). *Gamification in education and business*. Springer.

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Early Learning

Due to greater needs of learning-leisure balance, educational games specially developed for children and teens have sprung up

Fabian, K., Topping, K. J., & Barron, I. G. (2016). Mobile technology and mathematics: Effects on students' attitudes, engagement, and achievement. *Journal of Computers in Education, 3*(1), 77-104. doi: 10.1007/s40692-015-0048-8

Franca, S., Caterina, L., Nicola, F., Sara, M., & Alberto, B. (2014). Research game: An innovative educational tool for teachers and students. *SCIRES-IT: SCIentific RESearch and Information Technology, 4*(2), 109-116. doi: 10.2423/i22394303v4n2p109

Meyer, B. (2013). Game-based language learning for pre-school children: A design perspective. *Electronic Journal of e-Learning, 11*(1), 39-48.

Outhwaite, L. A., Gulliford, A., & Pitchford, N. J. (2017). Closing the gap: Efficacy of a tablet intervention to support the development of early mathematical skills in UK primary school children. *Computers & Education, 108*, 43–58. doi: 10.1016/j.compedu.2017.01.011

van Der Ven, F., Segers, E., Takashima, A., & Verhoeven, L. (2017). Effects of a tablet game intervention on simple addition and subtraction fluency in first graders. *Computers in Human Behavior, 72*, 200-207. doi: 10.1016/j.chb.2017.02.031

Wardaszko, M. (2016). Building simulation game-based teaching program for secondary school students. *Simulation & Gaming, 47*(3), 287-303. doi: 10.1177/1046878116635467

Yeh, M. K. C., Toshtzar, A., Guertin, L., & Yan, Y. (2016). Using spaced repetition and gamification to enhance K-12 student science literacy with on-demand mobile short reads. In *Proceedings of 2016 IEEE Frontiers in Education Conference (FIE)*. IEEE. doi: 10.1109/FIE.2016.7757361

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Game Design

Insights on game players' psychological needs, the employment of information and communications technology, and how to achieve the educational purposes

Abdul Jabbar, A. I., & Felicia, P. (2015). Gameplay engagement and learning in game-based learning. *Review of Educational Research, 85*(4), 740-779. doi: 10.3102/0034654315577210

Alaswad, Z., & Nadolny, L. (2015). Designing for game-based learning: The effective integration of technology to support learning. *Journal of Educational Technology Systems, 43*(4), 389-402. doi: 10.1177/0047239515588164

Çakıroğlu, Ü., Başıbüyük, B., Güler, M., Atabay, M., & Yılmaz Memiş, B. (2017). Gamifying an ICT course: Influences on engagement and academic performance. *Computers in Human Behavior, 69*, 98-107. doi: 10.1016/j.chb.2016.12.018

Chan, K., Tan, S., Hew, K., Koh, B., Lim, L., & Yong, J. (2017). Knowledge for games, games for knowledge: Designing a digital roll-and-move board game for a law of torts class. *Research and Practice in Technology Enhanced Learning, 12*(7). doi: 10.1186/s41039-016-0045-1

Fotouhi-Ghazvini, F., Earnshaw, R., Robison, D., Moeini, A., & Excell, P. (2011). Using a conversational framework in mobile game based learning-assessment and evaluation. In Proceedings of 2011 International Conference on ICT in Teaching and Learning (pp. 200-213). Springer. doi: 10.1007/978-3-642-22383-9_17

Gaydos, M. (2015). Seriously considering design in educational games. *Educational Researcher, 44*(9), 478-483. doi: 10.3102/0013189X15621307

Herro, D. (2015). Gaming the system: Culture, process, and perspectives supporting a game and app design curriculum. *Curriculum Journal, 26*(4), 579-600. doi: 10.1080/09585176.2015.1056819

Ke, F. (2016). Designing and integrating purposeful learning in game play: A systematic review. *Educational Technology Research and Development, 64*(2), 219-244. doi: 10.1007/s11423-015-9418-1

Malegiannaki, I., & Daradoumis, T. (2017). Analyzing the educational design, use and effect of spatial games for cultural heritage: A literature review. *Computers & Education, 108,* 1-10. doi: 10.1016/j.compedu.2017.01.007

Martinez-Maldonado, R., Goodyear, P., Carvalho, L., Thompson, K., Hernandez-Leo, D., et al. (2017). Supporting collaborative design activity in a multi-user digital design ecology. *Computers in Human Behavior, 71,* 327-342. doi: 10.1016/j.chb.2017.01.055

Mwangi, R. W., Waweru, R., & Mwathi, C. W. (2011). Integrating ICT with education: Designing an educational computer game for teaching functions in undergraduate mathematics. *Journal of Theoretical and Applied Information Technology, 26*(1), 53-63.

Nebel, S., Schneider, S., Schledjewski, J., & Rey, G. D. (2017). Goal-setting in educational video games. *Simulation & Gaming, 48*(1), 98-130. doi: 10.1177/1046878116680869

Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist, 50*(4), 258-283. doi: 10.1080/00461520.2015.1122533

Räisänen, T., Ypsilanti, A., Ropes, D., Vivas, A., Viitala, M., & Ijäs, T. (2014). Examining the requirements for an intergenerational learning game. *Education and Information Technologies, 19*(3), 531-547. doi: 10.1007/s10639-014-9324-x

Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior, 69,* 371-380. doi: 10.1016/j.chb.2016.12.033

Learning Outcomes

Discussions on the benefits of educational game as a pedagogical tool in today's teaching and learning, with a focus on its support to psychological needs

Baek, Y., & Touati, A. (2017). Exploring how individual traits influence enjoyment in a mobile learning game. *Computers in Human Behavior, 69,* 347-357. doi: 10.1016/j.chb.2016.12.053

Buckley, P., & Doyle, E. (2016). Gamification and student motivation. *Interactive Learning Environments, 24*(6), 1162-1175. doi: 10.1080/10494820.2014.964263

Buckley, P., & Doyle, E. (2017). Individualising gamification: An investigation of the impact of learning styles and personality traits on the efficacy of gamification using a prediction market. *Computers & Education, 106,* 43-55. doi: 10.1016/j.compedu.2016.11.009

Chang, C.-C., Liang, C., Chou, P.-N., & Lin, G.-Y. (2017). Is game-based learning better in flow experience and various types of cognitive load than non- game-based learning? Perspective from multimedia and media richness. *Computers in Human Behavior, 71,* 218-227. doi: 10.1016/j.chb.2017.01.031

Hamari, J., Shernoff, D. J., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behavior, 54*, 170-179. doi: 10.1016/j.chb.2015.07.045

Hawlitschek, A., & Joeckel, S. (2017). Increasing the effectiveness of digital educational games: The effects of a learning instruction on students' learning, motivation and cognitive load. *Computers in Human Behavior, 72*, 79-86. doi: 10.1016/j.chb.2017.01.040

Jong, M. S. Y. (2015). Does online game- based learning work in formal education at school? A case study of VISOLE. *Curriculum Journal, 26*(2), 249-267. doi: 10.1080/09585176.2015.1018915

Lee, H., Parsons, D., Kwon, G., Kim, J., Petrova, K., Jeong, E., & Ryu, H. (2016). Cooperation begins: Encouraging critical thinking skills through cooperative reciprocity using a mobile learning game. *Computers & Education, 97*, 97-115. doi: 10.1016/j.compedu.2016.03.006

Yang, J. C., Quadir, B., & Chen, N.-S. (2016). Effects of the badge mechanism on self-efficacy and learning performance in a game-based English learning environment. *Journal of Educational Computing Research, 54*(3), 371-394. doi: 10.1177/0735633115620433

Yildirim, I. (2017). The effects of gamification-based teaching practices on student achievement and students' attitudes toward lessons. *The Internet and Higher Education, 33*, 86-92. doi: 10.1016/j.iheduc.2017.02.002

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Makerspace

A physical space where people get together to collaborate, create, learn new knowledge and skills with fun. Playful games and projects are ideal to fit in the space and realize goals

Mayer, B. (2013, July 2). Creating game-based makerspaces. *American Libraries*. Retrieved 2017, March 21 from https://americanlibrariesmagazine.org/blogs/the-scoop/creating-game-based-makerspaces/

Nickels, C. (2016, July 24). Makerspaces, training, and engagement: Using digital games both to encourage engagement in university makerspaces and as a framework to drive student learning. *Charles Sturt University*. Retrieved 2017, April 6 from http://thinkspace.csu.edu.au/gblcompendium/part-3-invitation/makerspaces-training-and-engagement/

Pittser, B. (2016, September 1). Why you need games for your makerspace. *Filament Games*. Retrieved 2017, April 6 from https://www.filamentgames.com/blog/why-you-need-games-your-makerspace

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STEM Education

Studies on how educational games assist learners to excel in science, technology, engineering and mathematics (STEM)

Alanne, K. (2015). An overview of game- based learning in building services engineering education. *European Journal of Engineering Education, 41*(2), 204-219. doi: 10.1080/03043797.2015.1056097

Cai, Y., Goei, S. L., & Trooster, W. (2016). *Simulation and serious games for education.* Singapore: Springer.

Chen, C.-H., & Chiu, C.-H. (2016). Employing intergroup competition in multitouch design-based learning to foster student engagement, learning achievement, and creativity. *Computers & Education, 103*, 99-113. doi: 10.1016/j.compedu.2016.09.007

de-Marcos, L., García-López, E., & García-Cabot, A. (2017). Dataset on the learning performance of ECDL digital skills of undergraduate students for comparing educational gaming, gamification and social networking. *Data in Brief, 11*, 155-158. doi: 10.1016/j.dib.2017.01.017

Jamaludin, A., & Hung, D. (2017). Problem-solving for STEM learning: Navigating games as narrativized problem spaces for 21 st century competencies. *Research and Practice in Technology Enhanced Learning, 12*(1). doi: 10.1186/s41039-016-0038-0

Johanna, P., & Gütl, C. (2015). Educational gamified science simulations. In T. Reiners & L. C. Wood (Eds.), *Gamification in Education and Business* (pp. 253-275). Springer.

Korn, O., & Dix, A. (2016). Educational playgrounds: How context-aware systems enable playful coached learning. *Interactions, 24*(1), 54-57. doi: 10.1145/3012951

Mathrani, A., Christian, S., & Ponder-Sutton, A. (2016). PlayIT: Game based learning approach for teaching programming concepts. *Educational Technology and Society, 19*(2), 5-17.

Peng, C., Cao, L., & Timalsena, S. (2017). Gamification of Apollo lunar exploration missions for learning engagement. *Entertainment Computing, 19*, 53-64. doi: 10.1016/j.entcom.2016.12.001

Petri, G., & Gresse Von Wangenheim, C. (2017). How games for computing education are evaluated? A systematic literature review. *Computers & Education, 107*, 68-90. doi: 10.1016/j.compedu.2017.01.004

Ramaraj, A., & Nagammal, J. (2017). Examining the plausibility of fostering creativity through puzzles in architectural education: An exploratory sequential study. *Thinking Skills and Creativity, 24*, 48-62. doi: 10.1016/j.tsc.2017.02.001

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