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The Critical Success Factors on Gamification to Support the Learning Process in University

Ferdianto^{1,2}, Mohamad Noorman Masrek², Mohd Nasir Ismail², Norizan Anwar², Yohannes Kurniawan¹

¹ Information Systems Department, School of Information Systems, Bina Nusantara University, Jakarta, Indonesia

² Faculty of Information Management, Universiti Teknologi MARA, Selangor, Malaysia

ferdianto@binus.edu, mnoorman@uitm.edu.my, nasir733@uitm.edu.my, norizan8027@uitm.edu.my, ykurniawan@binus.edu
Tel: 03-79622001

Abstract

Gamification is the process of implementing a game strategy in the learning process. Gamification in the lecture environment increases creativity and interactivity and provides students a sensation of accomplishment (Sense of accomplishment). The development of communication technology increased rapidly, which impacted the development of the games industry, which attracted Indonesian people in this case. Therefore, gamification can be an alternative to represent innovative and exciting learning for students in Indonesia. In this Research, the authors tried to analyze the determinants of the effectiveness of learning using gamification

Keywords: Gamification; Learning; Critical Success Factors; University Students; Learning Process

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1.0 Introduction

Learning was a never-ending process. We need many ways to make learning fun and achieve students' goals.

The Coronavirus outbreak (Covid-19) started in 2020. It brought challenges and changes to people's daily lives. Everything turns to shift from offline process to online process, especially in the learning process.

This situation is sufficient to describe that the change in the learning system has suddenly turned into an online learning method (E-Learning). Online Learning Process also causes learning problems in Indonesia, such as:

- (1) Decreasing the level of active student participation in Lectures.
- (2) Monotonous learning system. Lecturers only give assignments to be done by the students and limit teaching time on the online session. The students have difficulty with their assignments, and sometimes they cannot easily find the lecturers to ask about the materials and assignments.

The development of game industry technology significantly impacted the learning process, especially in universities. In Indonesia, Gamification is one of the options used by universities to share knowledge with their students. Gamification has various game designs such as interactive videos, role-playing simulations, virtual reality, and others. Gamification in Education is changing the learning process using video games. By implementing Gamification in Education, students can continue motivated to learn in learning or E-Learning. In

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short, gamification is a technique to motivate someone to complete an activity by giving us fun when doing the task and after successfully doing it. The frequently used applications such as Kahoot, Habitica, EpicWin, and Zombies Run! and many others. This paper aims to define "what success factors of gamification support the learning process for students in the university".

2.0 Literature Review

2.1 Gamification

According to Su & Cheng (2015), gamification defines as the "Use of game mechanics and game design elements in a non-game context to engage individuals and solve the issues" (Clark et al., 2011). A literature review shows a significant increase in the interest in using gamification in education. Gamification increases student learning outcomes and involvement (Clark et al., 2011). McGonigal (2011) states that the games provide a fun element along with the nature of the game (intrinsic motivation).

Therefore, intrinsic motivation is very influential for students to learn by applying a game mechanism to the students in order to increase student intrinsic motivation in learning (Hanus & Fox, 2015). Apart from that, the game also offers visual displays such as badges (Kapp, 2012) and can provide freedom for students not to fear even though they fail, making students want to learn (Lee & Hamer, 2011).

In addition, the heritage review also provides insight into how to use games in education or the use of game elements that apply in education, starting from elementary school (Su & Cheng (2015) to secondary (Giannakos, 2013) and tertiary education (Dib & Adamo-Villani, 2014). Furthermore, gamification uses to teach various lessons (Yang, Chien, and Liu, 2012). For example, nanotechnology (Blonder & Sakhnini, 2012), citizenship education (Lim & Ong, 2012), and veterinary education (De Bie & Lipman, 2012). Only a little research focuses on the teachers and the classroom gamification research (Pivec & Pivec, 2011).

2.2 Critical success factors (CSFs)

The study by Rockart (1979, as cited by Hua, Wen, and Chan 2009) notes CSFs as "a limited number of dimensions to ensure successful competitive performance for an organization" (p.61). Caralli (2004) notes that Ronald Daniel, the 1960s four decades ago, introduced the CSFs concept (p.7). This concept build theory on eliminating that not contribute irrelevant factors to the firm planning process success, and that believe that theories to all industry with three or six factors that success determine. (Alagse, 2000) Kenichi Ohmae, in the 1960s, was developed and used this concept to implement planning and strategies (para.1). Leidecker & Bruno (1984, as cited by Baker, 1998) notes that CSFs are "characteristics, conditions or variables that when properly sustained, maintained or managed, can have a significant impact on the success of a firm competing in a particular industry" (p.82). (Leidecker & Bruno 1984 cited by Baker,1998) CSFs implicate in the level of industry analysis that focuses on specific factors for the essential structure industry that impact the performance of any organizations operating in the industry (p.82). However, the concept of CSFs is not only used to impact an organization but is also highly suitable for assessing the industry's competitiveness.

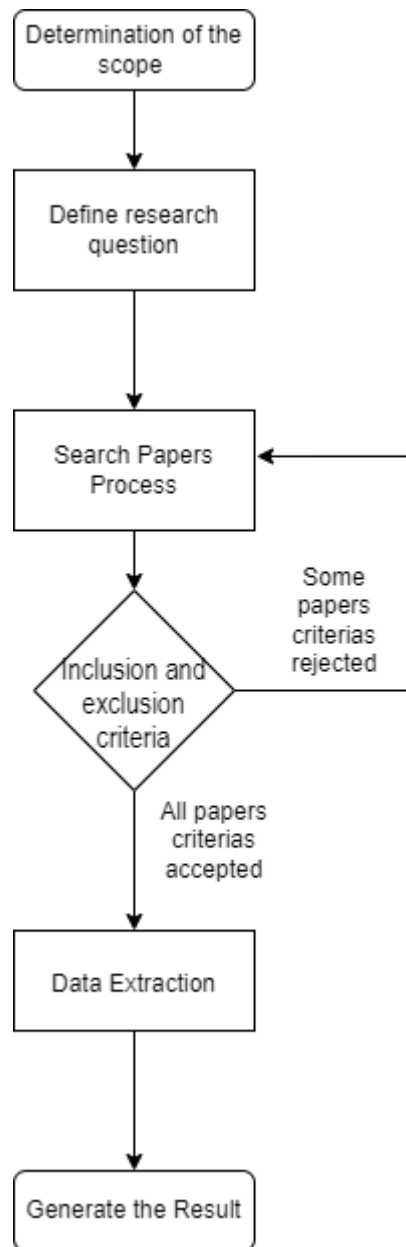
2.3 E-Learning

The education dictionary has many definitions of e-learning (Payne, 2003): "E-Learning identifies various types of computer-aided learning, usually using modern technological means; CDROM. E-learning is expanding, especially in the sphere of distance education and corporate training" some definitions are: "E-learning can be understood as an educational process, using information and communication technologies to create training, to distribute learning content, communication between students and teachers and for management of studies" E-learning challenges that normal ways of learning and coaching, and that provides new solutions for issues. (Wagner, 2008).

For example, the role of academics may be dynamic, from importers knowing to expeditors the data (Haverila & Barkhi, 2009). Furthermore, it can be an excellent learning practice that surpasses the education a full classroom may encounter. It is active, self-paced learning (Obringer, 2002). E-learning also involves various kinds of learning and educational resources. The exact meaning of E-Learning is "technology-enhanced learning (TEL), computer-based instruction (CBI). The other meaning of e-learning such as computer-based training (CBT), computer-assisted instruction or computer-aided instruction (CAI), internet-based training (IBT), web-based training (WBT), online education, virtual education, virtual learning environments (VLE) (which are also called learning platforms), learning, and digital educational collaboration. We used e-learning to refer to almost whatever learning environment in electronic media, like computers, used as a part of an instructional delivery system. E-learning may refer to various learning settings. The settings may range from email use to supplement print-based materials transmitted on the range to courses delivered fully by technology, like computers. (Arkorful, 2014).

3.0 Research Methodology

Systematic Literature Review is used in this research. We conduct deep literature reviews by using Systematic Literature Review, thus we can explore the field of the research and gain more insights and perspectives from previous work in the area. Picture 1 shows the method process used in this paper. There are three stages needed in doing a Systematic Literature Review. The first stage is the introduction, which includes, determination of the scope and research question, selection of literature sources and keywords, and determination of the inclusion and exclusion criteria for sorting the paper. The next stage is to conduct data extractions. And the last stage is to analyze the findings.



Picture 1 - the method process

3.1 Introduction Stage

The research question is “What are the success factors of Gamification to Support the Learning Process in University?”. In this research, the scope is to summarize the key factors in gamification. The focus is dedicated to learning university.

3.1.1 Search Process

After defining the research question, settling the sources (digital libraries or databases) is necessary to create the SLR. The selected sources for SLR are as follows:

- Science Direct (www.sciencedirect.com)
- IEEEXplore Digital Library (ieeexplore.ieee.org)
- Emerald Insight (www.emeraldinsight.com)
- ResearchGate (www.researchgate.net)

To Search that focuses on a paper related to the defined research question. The keyword uses Boolean operators: AND, OR, and NOT. To find the keyword, the defined search strings are:

- ('Success factor' OR 'Critical success factor' OR 'CSF') AND ('gamification' OR 'gamified learning') AND ('education' OR 'learning')

3.1.2 Inclusion and exclusion criteria

The data extraction table contains sources, studies found, candidates and selected studies to create a data extraction SLR Paper. First, find the source; the way to find the source is to search for keywords. After looking for the source, then look for 'studies found,' 'studies found' are searched based on reading the paper's title. Candidates for our candidate study must read an abstract paper. If the abstract is still research-related, it will include in the candidate's study. All the candidate's study papers considered as 'selected studies' and 'selected studies' are searched based on the introduction and conclusion of the papers. Papers before 2010 will sort by date of publication and place of publication. Here are some of these reasons:

- Must obtain more recent and accurate information.
- Obtain quality literature from some sources.

SLR excludes duplicate papers with the same study. SLRs should concentrate on CSF gamification.

3.2 Data Extraction

This SLR started in September 2020 and examined 227 papers. Among 227 papers examined, 36 papers have a research question and conceptual basis related to this study's title. After being studied, there are only 11 papers have been selected that can include in this study.

Others appear in sources because the author mentions a few papers in 'selected studies.' These Papers exclude from recently mentioned sources.

Table 1. Paper from studies found until selected studies

Source	Studies Found	Candidate studies	Selected studies
Science Direct	91	14	3
IEEE	12	3	1
Emerald	15	7	3
Research Gate	99	12	4
Total	227	36	11

4.0 Result and discussion

4.1 Demographic and trend characteristics

- Publishing outlets

There are published papers on Critical success Factors in Gamification Learning. All journal, conference, and also Research Report is one paper. Overall, journals or conferences total is 11 papers. For detail publishing outlets can be seen in table 2

Table 2. List of paper publication

Journal/conference	Journal/conference name	#	%
Conference	2019 International Symposium on Computers in Education (SIIE)	1	9.09%
Conference	21st International Conference on Knowledge Based and Intelligent Information and Engineering Systems	1	9.09%
Conference	2nd International Conference on Higher Education Advances	1	9.09%
Conference	7th World Conference on Educational Sciences, (WCES-2015)	1	9.09%
Journal	Australian Educational Computing	1	9.09%
Research Report	Behavioural Economics in Action	1	9.09%
Journal	Australian Educational Computing	1	9.09%
Journal	International Journal of Educational Technology in Higher Education	1	9.09%
Conference	2019 International Symposium on Computers in Education (SIIE)	1	9.09%
Journal	E-Learning and Digital Media	1	9.09%

Journal	Journal of E-Learning and Knowledge Society	1	9.09%
Total		11	

- Most prolific authors

Of 28 authors who research Gamification Learning, the most research about using Gamification Learning is Darina Dicheva from Kernersville, North Carolina, United States, and Christo Dichev Winston – Salem, North Carolina, United States wrote two papers. Darina Dicheva from the Department of Computer Science Ph.D. of Winston-Salem State University, North Carolina, United States. For detail about the most prolific authors can see table 3.

Table 3. Data most prolific authors

Authors	#	%
Darina Dicheva	2	6.66%
Christo Dichev	2	6.66%
Wendy Hsin-Yuan Huang	1	3.33%
Dilip Soman	1	3.33%
Sandra Maria Correia Loureiro	1	3.33%
Ricardo Godinho Bilro	1	3.33%
Fernando José de Aires Angelino	1	3.33%
Marko Urh	1	3.33%
Goran Vukovic	1	3.33%
Eva Jereb	1	3.33%
Rok Pintar	1	3.33%
José Martí-Parreño	1	3.33%
Diana Seguí-Mas	1	3.33%
Elies Seguí-Mas	1	3.33%
Alexandru Topîrceanu	1	3.33%
Chanut Poondej	1	3.33%
Thanita Lerdpornkulrat	1	3.33%
Tao Jueru	1	3.33%
Rui Ferrão e Silva	1	3.33%
Sílvia Ferrão	1	3.33%
Kasper Welbers	1	3.33%
Elly A Konijn	1	3.33%
Christian Burgers	1	3.33%
Anna Bij de Vaate	1	3.33%
Allison Eden	1	3.33%
Britta C Brugman	1	3.33%
Filomena Faiella	1	3.33%
Maria Ricciardi	1	3.33%
Total authors: 28 authors	30	

- Background of authors

From 28 Author, The most Background of author are Academic with 25 author. And 3 more author are industry. For detail data can seen in Table 4.

Table 4: Background of authors

Background author	#	%
Academic	25	89.28%
Industry	3	10.71%

Total	28
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The Factors of Gamification Learning are 15 factors from 10 kinds of literature. The factor will be a critical success factor of gamification used in university or education. With these 15 factors, people can use gamification as well.

There are all CSFs are listed below with explanation, and Table 4 shows about 15 factors that influence the success factor of gamification in education.

- Challenges: Gamification must be a challenge. Challenges can be like competence or high score. So, everyone wants to be better than everyone else.
- Engaging & Motivating: Gamification must lose or win when someone loses. Gamification must have a way to make the person not down or feel uncomfortable. for example, "sir, give me motivational words or funny memes when you lose" (example: implementation in Kahoot)
- Fun & Addicting: Not only does it need to be challenging, but gamification must also have fun when playing it—for example, having different types of games.
- Effectiveness on practical experience substitute. Effectiveness in providing practical learning. Examples include role-playing or using AR in medical science.
- Daily Task / Learning: Students will get at least new knowledge every day with daily assignments. Things that trigger students to do daily assignments such as giving points, giving achievement/streak
- Goal to Archive / Leaderboard: There are goals to be achieved. The example: Want to be in the top 100 on the leaderboard. Alternatively, It wants to reach a certain level.
- Rapid Feedback. A system for measuring player understanding and making instructional decisions. It also allows players to evaluate their learning, see the results of their efforts, and make decisions about strategies and next steps.
- Personalization: Game personalization against game criteria. Such as experience, level, and others.
- Visible status: This allows players to see the status of other players. The status will increase the player's competence.
- Unlocking Content: Unique content that can only open with specific criteria. Like reaching a certain level
- Freedom of Choice: Have the freedom to choose, such as choosing to be the red or yellow team
- Freedom to fail: There is no penalty for the losing player. So that players do not feel like a failure.
- Storyline: Has a unique storyline in gamification learning
- Onboarding: Elements such as reward system, level grouping, and leaderboard
- Time restriction: A time limit on a game can make the game even more stressful.

5.0 Conclusions

The Detailed CFSs Gamification can be seen in Table 5.

Table 5. CFSs gamification

No.	Factor	Qty (#)	Reference
1	Challenging	3	1,3,6
2	Engaging & Motivating	8	1,2,3,4,5,6,7,8
3	Fun & Addicting	3	1,5,9,10
4	Effectiveness on practical experience substitute	5	2,3,6,7,10
5	Daily Task / Learning	1	3
6	Goal to Achieve / Leader boards	4	3,4,5,6
7	Rapid Feedback	3	3,4,8
8	Personalization (Customize level & Character)	2	4,9
9	Visible user status	2	4,5
10	Unlocking content (Points & Rewarding)	3	3,4,5
11	Freedom of Choice	1	4
12	Freedom to fail	1	4
13	Storyline	2	4,6
14	On boarding	1	4
15	Time restriction	1	4

For detail data of authors can see in Table 6.

Table 6. List of Authors

No	Author
1	Wendy Hsin-Yuan Huang and Dilip Soman (2013)

- 2 Sandra Maria Correia , Ricardo Godinho Bilro and Fernando José de Aires Angelino (2020)
 - 3 Marko Urh, Goran Vukovic, Eva Jereb, Rok Pintar (2015)
 - 4 José Martí-Parreño, Diana Seguí-Mas and Elies Seguí-Mas (2016)
 - 5 Alexandru Topîrceanu (2017)
 - 6 Chanut Poondej and Thanita Lerdpomkulrat (2016)
 - 7 Darina Dicheva and Christo Dichev (2017)
 - 8 Tao Jueru, Rui Ferrão e Silva and Sílvia Ferrão (2019)
 - 9 Kasper Welbers, Elly A Konijn, Christian Burgers, Anna Bij de Vaate, Allison Eden, Britta C Brugman (2019)
 - 10 Filomena Faiella and Maria Ricciardi (2015)
 - 11 Darina Dicheva and Christo Dichev (2015)
-

With approach used in systematic literature review, 15 success factors gamification were obtained at the university. The application of gamification in the education system has very high potential. This also affects the level of student interest in cellphone games and other gadgets. The 15 factors can be used to design, enhance and adapt the current gamification conditions. In addition, the 15 key factors also use by practitioners to learn more about system at gamification which can be useful and become the basis development of gamification.

The latest technology, such as gamification, is getting attention in the research field of marketing, especially in education. Through gamification, it is possible to construct different teaching scenarios and approaches to gather and understand their reactions, motivation, and involvement in their experiences with these teaching methods and scenarios.

Generally, the learning methods used in higher education are increasingly subject to the latest technology to provide new alternatives and support the mission of disseminating knowledge & motivating all stakeholders (Teachers, Students, and universities). Therefore, understanding the critical factors of gamification in education is not easy. It is not only for learning at universities but also for gamification platform providers.

6.0 Limitation

Due to the nature of the research carried out and the selection and screening process, this has several limitations. One of them is the limitation of writers in getting quality journals, but they are costly, which may confine the number of potential papers recognized and included in that review. However, none of these limitations reduce the value of this study.

7.0 Future research

The research result listed above there are 15 success factors for Gamification were obtained at the university. After This Research next, the author will Research Gamification in a company that focuses on Training new employees using Gamification.

References

- Dib, Hazar & Adamo, Nicoletta. (2014). Serious Sustainability Challenge Game to Promote Teaching and Learning of Building Sustainability. *Journal of Computing in Civil Engineering*. 28. A4014007. 10.1061/(ASCE)CP.1943-5487.0000357.
- Faiella F. and M. Ricciardi, "Gamification and learning: A review of issues and research (2015)," *J. E-Learning Knowl. Soc.*, vol. 11, no. 3, pp. 13–21, 2015, doi: 10.20368/1971-8829/1072.
- Giannakos, M., & Vlamos, P. (2013). Educational Webcasts' Acceptance: Empirical Examination and the Role of Experience. *British Journal of Educational Technology*, 44, 125-143. <http://dx.doi.org/10.1111/j.1467-8535.2011.01279.x>
- Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & Education*, 80, 152–161. <https://doi.org/10.1016/j.compedu.2014.08.019>
- Harandi S. R.(2015), "Effects of e-learning on Students' Motivation," *Procedia - Soc. Behav. Sci.*, vol. 181, pp. 423–430, 2015, doi: 10.1016/j.sbspro.2015.04.905.t
- Haverila Matti, Barkhi Reza, (2009), *The Influence of Experience, Ability and Interest on e-learning Effectiveness*, School of Business and Management, Page(s) 1-13
- Huang, W. H.-Y., Soman D. (2013). *Gamification Of Education*. Report Series: Behavioural Economics in Action, 29.
- Jueru T., Silva R. F. E, Ferrao S.(2019), "Success factors for using gamification in language teaching," 2019. doi: 10.1109/SIIE48397.2019.8970125.

- Kapp, K. (2012) *The Gamification of Learning and Instruction. Game-Based Methods and Strategies for Training and Education*. Pfeiffer, San Francisco, CA.
- Lee, Joey & Hammer, Jessica. (2011). Gamification in Education: What, How, Why Bother?. *Academic Exchange Quarterly*. 15. 1-5.
- Lim, S.L., Ong, K.C., Chan, Y.H., et al. (2012) Malnutrition and Its Impact on Cost of Hospitalization, Length of Stay, Readmission and 3-Year Mortality. *Clinical Nutrition*, 31, 345-350. <https://doi.org/10.1016/j.clnu.2011.11.001>
- Loureiro S. M. C., Bilro R. G., Angelino and F. J. de A.(2020) , "Virtual reality and gamification in marketing higher education: a review and research agenda," *Spanish J. Mark. - ESIC*, vol. ahead-of-p, no. ahead-of-print, 2020, doi: 10.1108/sjme-01-2020-0013.
- Martí-Parreño J., Seguí-Mas D., Seguí-Mas E. (2016) , "Teachers' Attitude towards and Actual Use of Gamification," 2016, doi: 10.1016/j.sbspro.2016.07.104.
- McGonigal, J. (2011). *Reality is broken: Why games make us better and how they can change the world*. Penguin Press.
- Obringer, L. A. (2002). *How E-learning Works*. <http://www.howstuffworks.com>
- Payne, A.M., Stephenson, J.E. , Morris W.B., Tempest H.G., Mileham A., Griffin D.K. (2009), The use of an e-learning constructivist solution in workplace learning, *International Journal of Industrial Ergonomics*, Volume 39, Issue 3, 2009, Pages 548-553, ISSN 0169-8141, <https://doi.org/10.1016/j.ergon.2008.10.019>.
- Pivec, M. (2011). Book review - Learning with digital games: A practical guide to engaging students in higher education. *The International Review of Research in Open and Distributed Learning*, 12(6), 206-208. <https://doi.org/10.19173/irrodl.v12i6.1133>
- Poondej C. and Lerdpornkulrat T.(2016) , "The development of gamified learning activities to increase student engagement in learning," *Aust. Educ. Comput.*, 2016.
- Shan, B. Y., and Tham, J. M. K. (2013). "Perceived Critical Success Factors (Csfs) for the Tourism Industry of Penang Island : a Supply Perspective," *Interdiscip. J. Contemp. Res. Bus.*, vol. 4, pp. 495–510, 2013.
- Su, C.-H. and Cheng, C.-H. (2015), A mobile gamification learning system. *Journal of Computer Assisted Learning*, 31: 268-286. <https://doi.org/10.1111/jcal.12088>
- Topîrceanu A. (2017), "Gamified learning: A role-playing approach to increase student in-class motivation," *Procedia Comput. Sci.*, vol. 112, pp. 41–50, 2017, doi: 10.1016/j.procs.2017.08.017.
- Urh M., Vukovic G., Jereb E., Pintar R. (2015), "The Model for Introduction of Gamification into E-learning in Higher Education," *Procedia - Soc. Behav. Sci.*, 2015, doi: 10.1016/j.sbspro.2015.07.154.
- Wagner, Nicole & Hassanein, Khaled & Head, Milena. (2008). *Who is Responsible for E-Learning Success in Higher Education? A Stakeholders' Analysis.. Educational Technology & Society*. 11. 26-36.
- Welbers K., Konijn E. A., Burgers C., de Vaate A. B., Ede A. n, and Brugman B. C.(2019), "Gamification as a tool for engaging student learning: A field experiment with a gamified app," *E-Learning Digit. Media*, vol. 16, no. 2, pp. 92–109, 2019, doi: 10.1177/2042753018818342.
- Wen Hua, Andrew Chan, Zhenxing Mao (2009) Critical Success Factors and Customer Expectation in Budget Hotel Segment — A Case Study of China, *Journal of Quality Assurance in Hospitality & Tourism*, 10:1, 59-74, DOI: 10.1080/15280080802713702
- Yang, J.C., Chien, K.H. & Liu, T.C. (2012). A Digital Game-Based Learning System for Energy Education: An Energy CObservation PET. *Turkish Online Journal of Educational Technology*. 11 (2), pp. 27-37.