A Systematic Review on Digital Game-Based Versus Traditional Learning Approaches

Ghulam Mujtaba Yasir [*]   Ajaz Shaheen [†]   Muhammad Hafeez [‡]

Abstract A digital game-based learning approach is a sophisticated method in which the student is dynamically involved in the learning. The traditional or old learning technique is fully replaced by this learning strategy. Several research studies have demonstrated that employing a game-based strategy boosts learning. The purpose of the current review study was to employ descriptive and statistical approaches to compare the learning outcomes of pupils who used a digital game-based learning approach to those who used traditional learning strategies. A total of 26 papers published between 2012 and 2021 were chosen based on the inclusion and exclusion criteria. The previous research' literature evaluation revealed that the digital game-based learning method has proved to be a very operative learning technique in a number of disciplines and learning situations. Learners are extremely engaged in the learning process while using a digital game-based learning technique.

Introduction

Education is a basic human necessity as well as a critical component of a nation's development (Hafeez et al., 2020). The utmost significant problem in educational setup is the choice of appropriate and dynamic teaching tactics to assemble the educational process more successful and useful in terms of improving students' critical thinking abilities. (Senthamarai, 2018; Tavoosy & Jelveh, 2019). The instructor's captivating teaching method and the learners' dynamic participation in the teaching-learning process are two essential variables in developing critical thinking abilities among the students (Nelson, 2017). Instead of transferring knowledge, the teacher must function as a guide during the teaching-learning process (Molbaek, 2018). The traditional learning strategy is a one-way discourse in which an educator presents the material to the listeners. In this strategy, the teacher provides notes and assigns homework activities. In traditional learning strategy, no feedback session is conducted for the students. In general, there is limited interaction between students and teachers. Traditional learning strategies provide learners with a passive learning technique (Maqbool et al., 2018). Several researchers came up with the conclusion that traditional learning strategies have failed to impart conceptual information to learners (Arise, 2018; Bohari, 2020; Dufva & Dufva, 2016; Richards & Graber, 2019). As a result, traditional learning strategies are only suggested when information transmission is the primary goal. The traditional learning strategy does not help students build critical thinking abilities (Dehghanzadeh & Jafaraghaee, 2018). The basic concept of the traditional learning strategy is shown in figure 1.

[*] Assistant Professor of English, Government Associate College for Boys, Dera Ghazi Khan, Punjab, Pakistan.
[†] Assistant Professor, Department of Education, Lasbela University of Water, Agriculture and Marine Sciences, Uthal, Balochistan, Pakistan.
[‡] M.Phil Scholar, Department of Education, Institute of Southern Punjab, Multan, Punjab, Pakistan.
Email: mh9589041@gmail.com

Figure 1: Conceptual View of Traditional Learning Strategies

Pupils in the present age have been termed digital natives because they have grown up with digital technology. Now ICT has changed the learning style of the students. By using these technologies, they are more confident, autonomous, and creative (Lorenzo-Alvarez et al., 2020). The digital game learning strategy is based on activating prior knowledge, experience and giving instant feedback. This learning approach may be applied to real-world challenges (Hamari et al., 2016). Digital platform-based games motivate students and help them learn with full focus and participation. A play-based digital learning strategy improves students' ability to experience, create, communicate and visualize by accepting play challenges (Haruna et al., 2018). Computer games fulfill the real requirements and satiate the interests of adults and have become the most widespread computer-based activity by providing a new means of communication. The chief advantage of game-based learning is that it provides an engaging, creative, and better learning environment, thus supporting the learners to focus on their tasks. Modern computer-based and video game-based learning provide learning chances every second or fraction of a second (Moylan et al., 2015). Like everyone else, the learners like to work when it is not imposed on them (Prensky, 2003). Von Wangenheim & Shull (2009) argued that the real value of video games and computers is that they permit people to reconstruct themselves in new worlds of learning. Educational games make the learners act as a main role in the learning process, making the learning easier, more enjoyable, and efficient. The objective of the current review study was to compare the consequences of previously published studies on the traditional and game-based learning strategies in descriptive and statical ways. The game-based learning strategy and its effectiveness is shown in figure 2.
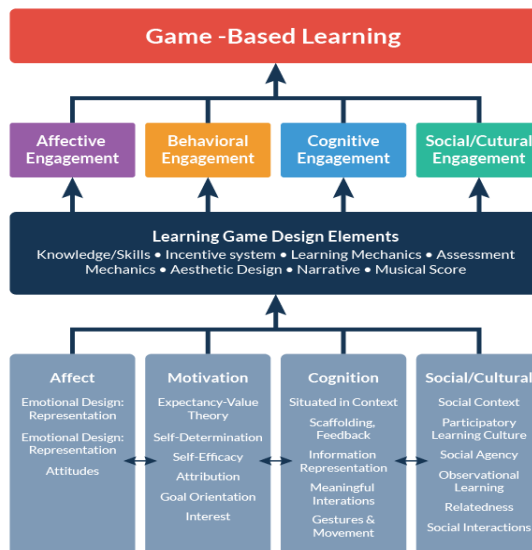

Figure.2: Basic Concept of Digital Game-Based Learning Strategy

Methodology

Article Selection Process

The key objective of the current review research was to compare the significance of digital game-based and traditional learning strategies. For this purpose, Web of Science and Scopus databases were selected to collect the review of related articles. In the Web of Science and Scopus interface, digital game-based versus traditional learning strategies terms were entered as the main contents of the search. The custom year range from 2012 to June 2021" was determined as the time limit for the current Study. The advanced search was done from 10th to 15th September 2021. Based on the initial results, 126 papers were discovered. The specific inclusion criteria were applied to limit articles for review on the digital game-based versus traditional learning strategies. The first criterion was to use "Educational research" as a web of science and Scopus category. "Only items" as documents and Pdf types were the other inclusion criterion. After applying the inclusion criteria, 51 articles have been found. In order to conclude the research and review articles to be reviewed, specific exclusion criteria were then implemented. The first criterion of exclusion was to exclude more than once the same articles. Secondly, articles not available in the full text were to be excluded. The final criterion for exclusion included the removal of articles that had no direct connection with the comparison of digital game-based and traditional learning strategies. Finally, the main sample of this systemic review study was determined by a total of 26 articles. The main selection process is summarized in Figure 3.
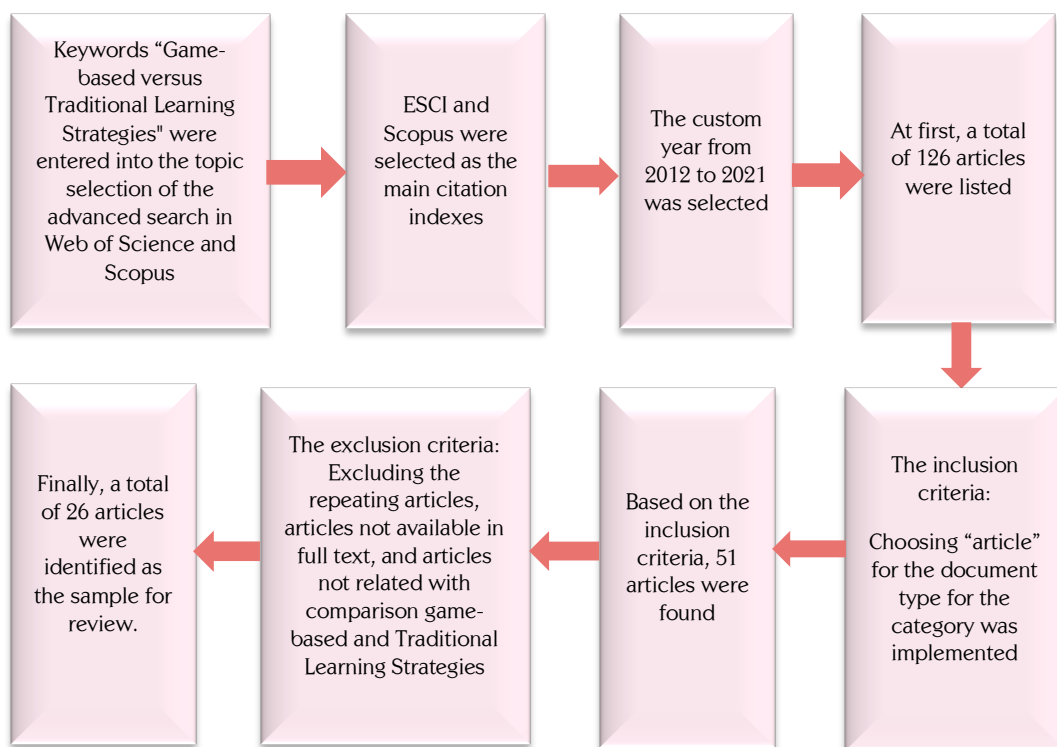

Figure.3: Article Selection Process

Review of Literature

Traditional Learning Strategy

Previous studies have found that learners had conflicting opinions of traditional learning strategies for their efficacy (Lo et al., 2020).

Nurutdinova et al. (2016) conducted research at a primary school for grade five pupils to assess the efficiency of various learning methodologies. According to the Study's findings, traditional learning strategies resulted in worse critical

thinking abilities in learners when compared to other learning methodologies. Some studies also determined that when learning information is not available in written form, such as a book, the traditional learning technique is a viable option (Alaagib et al., 2019; Balliu, 2017). Zlotskaya (2016) suggested a study to assess the applicability of learning strategies in different learning contexts. The Study's findings indicated that the traditional learning is a good learning strategy, particularly when there is a large number of learners in front of the instructor.

Game-Based Learning Strategy

Researchers defined a game-based learning strategy as voluntary, an immersive and enjoyable learning activity in which inspiring objectives are followed according to the approved rules (Stenros, 2017). Chang & Yeh (2021) proposed that combining computer games with educational goals and objectives not only stimulate student learning but also motivate them and provide them interactive and innovative learning opportunities. Kikot et al. (2014) pointed out that the essence of using computer games is one of the most natural types of learning. Burguillo (2010) proposed a framework to implement ability-based learning to motivate students and improve their academic achievements. Watson et al. (2011) and Holbrey, (2020) introduced the classroom usage of game-based educational learning strategy in undergraduate courses and resulted in that usage of game-based learning strategy led to changes in traditional learning strategies. The instructor-centered learning strategy is transformed into a learner-centered learning strategy, in which learners are more dynamic and involved. The comparison between the advantages and disadvantages of traditional and game-based learning strategies are illustrated in Table 1.

Table 1. Advantages and Disadvantages of Traditional Based and Game-Based Learning Strategies

Learning Strategy	Advantages	Disadvantages
Lecture Based	Information may be given in an impressive and timely manner. It has the potential to pique people's interest in the subject matter. It boasts one's speaking ability and vocabulary. By employing a variety of languages, it may be tailored to the needs of all students. Various ways can be used to address the issues.	It appears to be a waste of time to convey material that is already presented in the books. The teacher must prepare the lesson from many perspectives. If the lecturer speaks quickly throughout the lecture, it may be difficult for many students to follow along. The students become apathetic. Between the learners and the instructor, there is no contact or cooperation.
Game-Based	The competition is low-risk. The development of "soft" talents promotes social-emotional development. Student-centered education Boost a child's memory capacity Fluency with computers and simulations	Too much time spent in front of the screen. Games aren't usually made in the same way. Games can be a source of distraction. It requires a technology learning curve. Not always in line with teaching or learning objectives

The descriptive results of the studies reviewed in this article are illustrated in table 2. A total of 26 published articles in various data bases from 2012 to 2021 were selected for conducting this review study by selecting the inclusion and exclusion criteria. The results of most of the articles reviewed showed that game-based learning strategy was an effective and critical thinking skill developed strategy. The learners felt very useful and enjoyable learning environment in the game based learning strategy.

Table. 2. The Outcomes of the Studies Reviewed in current Study

Reference	Class	Subject	Outcomes
Rondon et al. (2013)	Undergraduate	Anatomy and Physiology	Game-based strategy demonstrated to be an operative strategy.
Telner et al. (2010)	Graduate Medical Students	Stroke Prevention and Management	The learners in game-based learning reported more satisfaction level.
Brumels et al. (2008)	Undergraduate Students	Educational Training	The use of video games increased learners' enjoyment and engagement.
Kliem & Wiemeyer, (2010)	Health Care Volunteers	Training Programme	Game-based learning improved the efficiency of the experimental learning group.
Proske et al., (2014)	Undergraduate Students	Essay Writing	The game-based practice was found to be substantially more intriguing and engaging by the students.
Boeker et al., (2013)	Medical Students	Urology	Students in the game-based learning group outperformed those in the conventional learning group on the cognitive knowledge exam.
Holbrey (2020)	final-year undergraduate	Primary Education	While compared to the traditional learning technique, students reported higher levels of engagement, focus, and retention when using a game-based learning strategy.
Liao (2010)	Undergraduate	Various Courses	The learners' learning process was greatly improved by the game-based learning technique.
Dortaj (2014)	Third Grade	Math	The outcomes of the research indicated that motivation and achievement levels of students who had been trained through game-based learning were more compared to motivation and achievement levels of the students who had been trained through the traditional learning strategy.
Hsu et al. (2008)	Undergraduate	Chemistry	The learners' learning process was improved by using a game-based learning technique.
Chen et al. (2019)	Fourth-Grade Students	Various Subjects	The learners' involvement in the learning process was greatly boosted by using a game-based learning technique.
Widiana et al. (2018)	Fourth Grade Students	Essay Test	The Study concluded positive effects of game-based learning strategy on the pupil's cognitive process learning achievement.
Ghari et al. (2021)	University Students	Physical Education	The results showed that game-based learning strategy could enhance physical activity level and quality of motivation of university students in physical education classes.
Lo & Hew (2020)	Grade 9 Students	Mathematics	Flipped learning with gamification increased pupils' cognitive engagement more than traditional learning.

Reference	Class	Subject	Outcomes
Toharudin et al. (2021)	Secondary School Students	Different Subjects	The use of a game-based learning technique did not result in a substantial boost in student learning.
Boateng-Nimoh & Nantwi, (2020)	School Students	Different Subjects	The study concluded that the game-based learning strategy used in various subjects significantly improved the critical thinking skills and students' engagement.
Chen & Lin (2019)	Intermediate Students	Science Education	The participants' cognitive skills were improved by using a game-based learning technique.
Yang (2017)	Graduate students	Computer Science	Traditional learning strategies were shown to be less successful than game-based learning strategies.
Moradian & Nazdik, (2019)	High School Students	Disaster Risk Education	On students' knowledge, the game's teaching approach was more successful than traditional learning methods.
All et al., (2017)	Bank Employees	E-Learning	No significant improvement was shown by game-based learning strategy.
Iliadou et al. (2021)	Older Adults	Cognition Assessment	Declination in cognition skills by Game-based learning strategy
Purwaningru et al. (2017)	Elementary School	Healthy LifeStyle	Game-based learning has a higher mean score than traditional learning.
Segovia & Gutiérrez, (2020)	School Students	Primary Education	GBHIIT demonstrated to be beneficial in reversing the impacts on the body composition of schoolchildren.
Palasí Melià, (2020)	School Students	Secondary Education	The usage of a game-based learning technique increased the learning efficiency of school children.
Volk et al. (2017)	3rd Grade Students	Math	Learning outcomes have been improved in cognitive, affective-social and psychomotor learning domains.

Table 3. Statistical Results of the Studies Reviewed in current article

References	Learning Strategy	Mean	SD	p	Remarks
Rondon et al. (2013)	Game-based	2.83	0.32	0.003	Significant
	Traditional	2.24	0.41		
Telner et al., (2010)	Game-based	2.72	0.61	0.049	Significant
	Traditional	1.94	0.82		
Brumels et al., (2008)	Game-based	3.78	1.03	0.031	Significant
	Traditional	3.29	1.21		
Kliem & Wiemeyer, (2010)	Game-based	7.32	1.34	0.018	Significant
	Traditional	6.99	1.73		
Proske et al., (2014)	Game-based	11.34	2.23	0.009	Significant
	Traditional	9.30	2.76		
Boeker et al., (2013)	Game based	3.98	1.03	0.021	Significant
	Traditional	3.01	1.11		
Holbrey, (2020)	Game-based	4.67	2.01	0.02	Significant
	Traditional	3.89	2.12		
Liao, (2010)	Game-based	2.34	0.89	0.008	Significant
	Traditional	2.03	1.04		
Dortaj, (2014)	Game-based	9.92	3.23	0.0007	Significant
	Traditional	8.09	3.56		

References	Learning Strategy	Mean	SD	p	Remarks
Hsu et al., (2008)	Game-based	29.61	6.34	0.0001	Significant
	Traditional	27.82	7.01		
Chen et al., (2019)	Game-based	39.70	9.23	0.082	Non-significant
	Traditional	36.87	10.09		
Widiana et al., (2018)	Game-based	1.02	0.31	0.071	Non-significant
	Traditional	0.71	0.35		
Ghari et al., (2021)	Game-based	3.21	1.19	0.092	Non-significant
	Traditional	2.99	1.28		
Lo & Hew, (2020)	Game-based	5.81	2.08	0.07	Non-significant
	Traditional	7.01	2.31		
Toharudin et al., (2021)	Game based	18.17	4.56	0.002	Significant
	Traditional	16.09	4.70		
Boateng-Nimoh & Nantwi, (2020)	Game-based	1.34	0.39	0.023	Significant
	Traditional	1.01	0.42		
Chen & Lin, (2019)	Game-based	16.34	5.21	0.08	Non-significant
	Traditional	17.32	5.99		
Yang, (2017)	Game-based	21.22	6.92	0.0002	Significant
	Traditional	19.23	7.11		
Moradian & Nazdik, (2019)	Game-based	3.02	1.06	0.006	Significant
	Traditional	2.99	1.22		
All et al., (2017)	Game-based	23.21	7.56	0.05	Non-significant
	Traditional	25.90	7.98		
Iliadou et al., (2021)	Game based	12.23	4.23	0.09	Non-significant
	Traditional	13.29	4.50		
Purwaningrum et al., (2017)	Game based	5.21	1.79	0.02	Significant
	Traditional	4.99	2.04		
Segovia & Gutiérrez, (2020)	Game Based	7.87	2.89	0.0001	Significant
	Traditional	6.98	3.04		
Palasí Melià, (2020)	Game-based	2.12	1.01	0.005	Significant
	Traditional	1.87	1.10		
Volk et al., (2017)	Game-based	0.98	0.21	0.009	Significant
	Traditional	0.65	0.25		

Discussion

Traditional classroom learning relies on uninteresting learning skills and absences interaction. Learners lose interest about the objectives of learning courses. Students look forward to new learning techniques, digital assignments, and stimulating valuation models. In a higher education learning context, some new learning processes have been presented to attract active students and ignite the practices of self-learning, thereby paving the way for better knowledge of skills and abilities. With numerous inventions in ICT in a higher educational environment, the game-based learning approach is one of the innovative learning approaches that have aroused the interest of many universities. ICT paradigm shifts are entangled with various teaching methods adapted to students in the 21st century (Afari et al., 2013). ICTs have improved the efficiency and flexibility of learning and training systems and can be implemented in work settings, linking formal learning with informal learning. ICT helps universities prepare students through primary education and continuing professional development in international and global markets. Research on the adaptability of ICT in teaching shows that technological innovation in this field is achieved in different ways (Shah, 2017). Changes are needed from all levels of systems, organizations, and individuals to put the new teaching methods into practice. Teachers need to continuously develop teaching in their own teaching environment. These teaching environments are usually the junctions of different cultures and the most diverse groups of students and experts. ICT-assisted learning environments are becoming more and more common. They require teachers

to be able to use new systems and tools and new communication methods in a multicultural environment. At the organization and system levels, the planning and implementation entities require quality assurance (Plass et al., 2020).

Recent studies suggested that students growing in a digital game-based learning environment are psychologically different from generations of traditional learners. This is caused by the fact that it provides a direct linking between the struggle and the instant rewards that have been spent digitally all over the world. In contrast, class rewards are often repeated until an evaluation and formal inspection is carried out. Students have found recovery in the future so that it feels to learn in the future. On the other hand, digital students prefer to learn relevant, aggressive and immediate, and fun things (Chang et al., 2020). The famous psychiatrist William Glasser (Glasser, 1999) claimed that there is a close link between fun and learning. Glasser's theory of choice regards fun as a basic requirement that drives social behavior. The Pupils acquire best when they enjoy freely what they are educated because they have a great need to link and have fun.

In an educational environment, it is well known that computer games can provide a variety of benefits, such as involving students in an active learning environment, increasing inspiration, enhancing information retaining and improving real life problem-solving and critical thinking skills. Moreover, computer games let student groups to share knowledge learned, resources, skills, and collaboration to solve real life educational problems (Byun & Loh, 2015). Supporters of computer game-based learning believe that educational computer games have the ability to change the way of pupils learning styles and can inspire and involve a new group of students in a way that traditional learning approach does not have (Romero & Kalmpourtzis, 2020). Nazarova & Galiullina, (2016) pointed out that compared to the traditional classroom teaching method, the traditional classroom method is to provide facts and data, and then find out their relevance, so the game has a motivating effect, because the Players need to find facts and information to be successful complete the challenge. In the current study, a comparison between game based and traditional learning strategies were conducted. A total of 26 published articles were selected after setting inclusion and exclusion criteria. The conclusion of the Study reviewed showed that game based learning strategy is more effective learning strategy as compared to the traditional learning strategy. The learners engagement level increased more in game based learning strategy.

Conclusion

The goal of this study was to compare the outcomes of research on game-based learning with traditional learning using descriptive and statistical methods. Inclusion and exclusion criteria were used to identify 26 publications published between 2012 and 2021. According to the review of the selected papers, game-based learning is an effective learning approach. This learning strategy improves the learning process of the learning by engaging the learners towards the learning process. So, it is recommended on the basis of the results of the review studies that game based learning strategy should be used to increase the students learning process.

References

Afari, E., Aldridge, J. M., Fraser, B. J., & Khine, M. S. (2013). Students' perceptions of the learning environment and attitudes in game-based mathematics classrooms. *Learning Environments Research, 16*(1), 131-150. https://doi.org/10.1007/s10984-012-9122-6

Alaagib, N. A., Musa, O. A., & Saeed, A. M. (2019). Comparison of the effectiveness of lectures based on problems and traditional lectures in physiology teaching in Sudan. *BMC medical education, 19*(1), 365. https://doi.org/10.1186/s12909-019-1799-0

All, A., Nunez Castellar, E. P., & Van Looy, J. (2017). Testing the effectiveness of digital game-based learning in a corporate context: comparison to a passive e-learning approach. In ICA. https://biblio.ugent.be/publication/8534177/file/8538713

Arise, N. (2018). *The Effectiveness of Small Group Discussion Method in The Teaching of Reading Comprehension (Doctoral dissertation, Thesis)*. http://repositori.uin-alauddin.ac.id/id/eprint/12624

Balliu, V. (2017). Modern Teaching Versus Traditional Teaching-Albanian Teachers Between Challenges and Choices. *European Journal of Multidisciplinary Studies, 2*(4), 20-26. https://doi.org/10.26417/ejms.v4i4.p20-26

Boateng-Nimoh, V., & Nantwi, W. K. (2020). Modification of Ghanaian traditional abatɔɔ game to improve the quality of basic education. *Research Journal in Advanced Humanities, 1*(4). https://www.royalliteglobal.com/advanced-humanities/article/view/266

Boeker, M., Andel, P., Vach, W., & Frankenschmidt, A. (2013). Game-based e-learning is more effective than a conventional instructional method: a randomized controlled trial with third-year medical students. *PloS one, 8*(12), e82328. https://doi.org/10.1371/journal.pone.0082328

Bohari, L. (2020). Improving speaking skills through small group discussion at eleventh grade students of SMA Plus Munirul Arifin NW Praya. *JOLLT Journal of Languages and Language Teaching, 7*(1), 68-81. https://doi.org/10.33394/jollt.v7i1.1441

Brumels, K. A., Blasius, T., Cortright, T., Oumedian, D., & Solberg, B. (2008). Comparison of efficacy between traditional and video game based balance programs. *Clinical Kinesiology 62*(4), 26-31. https://www.proquest.com/openview/5a8e5af88bde91c8d9098d9f259cc36e/1?pq-origsite=gscholar&cbl=29722

Burguillo, J. C. (2010). Using game theory and competition-based learning to stimulate student motivation and performance. *Computers & Education, 55*(2), 566-575. https://doi.org/10.1016/j.compedu.2010.02.018

Byun, J., & Loh, C. S. (2015). Audial engagement: Effects of game sound on learner engagement in digital game-based learning environments. *Computers in Human Behavior, 46*, 129-138. https://doi.org/10.1016/j.chb.2014.12.052

Chang, C. Y., Kao, C. H., Hwang, G. J., & Lin, F. H. (2020). From experiencing to critical thinking: A contextual game-based learning approach to improving nursing students' performance in electrocardiogram training. *Educational Technology Research and Development, 68*(3), 1225-1245. https://doi.org/10.1007/s11423-019-09723-x

Chang, W. L., & Yeh, Y. C. (2021). A blended design of game-based learning for motivation, knowledge sharing and critical thinking enhancement. *Technology, Pedagogy and Education, 30*(2), 271–285. https://doi.org/10.1080/1475939x.2021.1885482

Chen, S. Y., & Lin, Y. S. (2019, September). *A Virtual Reality Game-Based Library Navigation Learning System for Improving Learning Achievement in Popular Science Education. In International Cognitive Cities Conference (pp. 174-182)*. Springer, Singapore. https://link.springer.com/chapter/10.1007/978-981-15-6113-9_19

Chen, Y. C., Lu, Y. L., & Lien, C. J. (2019). Learning environments with different levels of technological engagement: a comparison of game-based, video-based, and traditional instruction on students' learning. *Interactive Learning Environments, 29*(8), 1363–1379.

https://doi.org/10.1080/10494820.2019.162 8781

Dehghanzadeh, S., & Jafaraghaee, F. (2018). Comparing the effects of traditional lecture and flipped classroom on nursing students' critical thinking disposition: A quasi-experimental study. *Nurse Education Today, 71*, 151-156. https://doi.org/10.1016/j.nedt.2018.09.027

Dortaj, F. (2014). *Comparing the effects of game-based and traditional teaching methods on students 'learning motivation and math progress.* https://www.sid.ir/en/journal/ViewPaper.as px?ID=489925

Dufva, T., & Dufva, M. (2016). Metaphors of code—Structuring and broadening the discussion on teaching children to code. *Thinking Skills and Creativity, 22*, 97-110. https://doi.org/10.1016/j.tsc.2016.09.004

Ghari, B. A., Mohammadzadeh, H., & Dehghanizade, J. (2021). A Comparison of Game-Based and Traditional Instructional Approaches: A Study of Physical Activity, Self-Determined Motivation and Enjoyment. *Journal of Motor Learning and Movement, 13*(1), 109-127. https://dx.doi.org/10.22059/jmlm.2021.313 683.1546

Glasser, W. (1999). *Choice theory: A new psychology of personal freedom*. Harper Perennial. https://psycnet.apa.org/record/1999-02074-000

Hafeez, M., Kazmi, Q. A., Tahira, F., Hussain, M. Z., Ahmad, S., Yasmeen, A., & Saqi, M. I. (2020). Impact of School Enrolment Size on Student's Achievements. *Indonesian Journal of Basic Education, 3*(1), 17-21. https://doi.org/10.37728/ijobe.v3i1.302

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. https://doi.org/10.1016/j.chb.2015.07.045

Haruna, H., Hu, X., Chu, S. K. W., Mellecker, R. R., Gabriel, G., & Ndekao, P. S. (2018). Improving sexual health education programs for adolescent students through game-based learning and gamification. *International journal of environmental research and public health, 15*(9), 2027. https://doi.org/10.3390/ijerph15092027

Holbrey, C. E. (2020). Kahoot! Using a game-based approach to blended learning to support effective learning environments and student engagement in traditional lecture theatres. *Technology, Pedagogy and Education, 29*(2), 191-202. https://doi.org/10.1080/1475939X.2020.173 7568

Hsu, S. H., Wu, P. H., Huang, T. C., Jeng, Y. L., & Huang, Y. M. (2008, November). *From traditional to digital: Factors to integrate traditional game-based learning into digital game-based learning environment. In 2008 Second IEEE International Conference on Digital Game and Intelligent Toy Enhanced Learning (pp. 83-89).* IEEE. https://doi.org/10.1109/DIGITEL.2008.24

Iliadou, P., Paliokas, I., Zygouris, S., Lazarou, E., Votis, K., Tzovaras, D., & Tsolaki, M. (2021). A Comparison of Traditional and Serious Game-Based Digital Markers of Cognition in Older Adults with Mild Cognitive Impairment and Healthy Controls. *Journal of Alzheimer's disease, 79*(4), 1747-1759. https://content.iospress.com/articles/journ al-of-alzheimers-disease/jad201300

Kikot, T., Costa, G., Fernandes, S., & Águas, P. (2014). Why user-centered game-based learning in higher education? The case of cesim simbrand. *Journal of Spatial and Organizational Dynamics, 2*(3), 229-241. http://hdl.handle.net/11144/465

Kliem, A., & Wiemeyer, J. (2010). Comparison of a traditional and a video game based balance training program. *International Journal of Computer Science in Sport, 9*(2), 80-91. http://www.iacss.org/

Liao, Y. K. (2010, March). *Game-based learning vs. traditional instruction: A meta-analysis of thirty-eight studies from Taiwan. In Society for Information Technology & Teacher Education International Conference (pp. 1491-1498).* Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/primary/p/33 570/

Lo, C. K., & Hew, K. F. (2020). A comparison of flipped learning with gamification, traditional learning, and online

independent Study: the effects on students' mathematics achievement and cognitive engagement. *Interactive Learning Environments, 28*(4), 464-481. https://doi.org/10.1080/10494820.2018.1541910

Lo, S., Abaker, A. S. S., Quondamatteo, F., Clancy, J., Rea, P., Marriott, M., & Chapman, P. (2020). Use of a virtual 3D anterolateral thigh model in medical education: Augmentation and not replacement of traditional teaching? *Journal of Plastic, Reconstructive & Aesthetic Surgery, 73*(2), 269-275.
https://doi.org/10.1016/j.bjps.2019.09.034

Lorenzo-Alvarez, R., Rudolphi-Solero, T., Ruiz-Gomez, M. J., & Sendra-Portero, F. (2020). Game-Based Learning in virtual worlds: A multiuser online game for medical undergraduate radiology education within second life. *Anatomical sciences education, 13*(5), 602-617. https://doi.org/10.1002/ase.1927

Maqbool, S., Ismail, S. A. M. B. M., Maqbool, S., & Hassan, S. U. (2018). Effects of Traditional Lecture Method and Multi-Sensory Approach on ELT Learners at Graduate Level. *International Journal of Academic Research in Progressive Education and Development, 7*(4), 488-505.

Molbaek, M. (2018). Inclusive teaching strategies–dimensions and agendas. *International Journal of Inclusive Education, 22*(10), 1048-1061. https://doi.org/10.1080/13603116.2017.1414578

Moradian, M. J., & Nazdik, Z. M. (2019). Game versus lecture-based learning in disaster risk education; an experience on Shiraz high school students. *Bulletin of Emergency & Trauma, 7*(2), 112. https://dx.doi.org/10.29252%2Fbeat-070204

Moylan, G., Burgess, A. W., Figley, C., & Bernstein, M. (2015). Motivating game-based learning efforts in higher education. *International Journal of Distance Education Technologies (IJDET), 13*(2), 54-72. https://www.igi-global.com/article/motivating-game-based-learning-efforts-in-higher-education/128427

Nazarova, M., & Galiullina, E. (2016). Game-based learning in teaching English. *Journal*

of Organizational Culture, Communications and Conflict, 20*, 8-12. https://www.proquest.com/openview/0776f150d71ad6780a2d21328fb9aefb/1?pq-origsite=gscholar&cbl=38870

Nelson, A. E., (2017). Methods faculty use to facilitate nursing students critical thinking. *Teach. Learn. Nurs. 12* (1), 62–66. https://doi.org/10.1016/j.teln.2016.09.007.

Nurutdinova, A. R., Perchatkina, V. G., Zinatullina, L. M., Zubkova, G. I., & Galeeva, F. T. (2016). Innovative teaching practice: Traditional and alternative methods (challenges and implications). *International journal of environmental and science education, 11*(10), 3807-3819. https://files.eric.ed.gov/fulltext/EJ1116729.pdf

Palasí, M. N. (2020). *Introducing game-based and traditional learning in secondary education.* http://hdl.handle.net/10234/190313

Plass, J. L., Mayer, R. E., & Homer, B. D. (Eds.). (2020). Handbook of game-based learning. MIT Press.

Prensky, M. (2003). Digital game-based learning. *Computers in Entertainment (CIE), 1*(1), 21-21. https://doi.org/10.1145/950566.950596

Proske, A., Roscoe, R. D., & McNamara, D. S. (2014). Game-based practice versus traditional practice in computer-based writing strategy training: effects on motivation and achievement. *Educational Technology Research and Development, 62*(5), 481-505. https://doi.org/10.1007/s11423-014-9349-2

Purwaningrum, S. W., Saurina, N., & Adisusilo, A. K. (2017). Systematic Review to Compare Serious Game and Traditional Learning to Engage Children do Clean and Healthy Lifestyle. *International Journal of Engineering Research and Application, 7*(4), 18-26. http://www.ijera.com/

Richards, K. A. R., & Graber, K. C. (2019). Retention in PETE: Survey results and discussion. *Journal of Teaching in Physical Education, 38*(1), 53-60. https://doi.org/10.1123/jtpe.2018-0211

Romero, M., & Kalmpourtzis, G. (2020). Constructive Alignment in Game Design for Learning Activities in Higher

Education. *Information, 11*(3), 126. https://doi.org/10.3390/info11030126

Rondon, S., Sassi, F. C., & de Andrade, C. R. F. (2013). Computer game-based and traditional learning method: a comparison regarding students' knowledge retention. *BMC medical education, 13*(1), 1-8. https://doi.org/10.1186/1472-6920-13-30

Segovia, Y., & Gutiérrez, D. (2020). Effect of a game-based high intensity interval training program on body composition in primary education: comparison of the Sport Education model and traditional methodology. *Journal of Physical Education and Sport, 20*(2), 791-799. DOI:10.7752/jpes.2020.02113

Senthamarai, S. (2018). Interactive teaching strategies. *Journal of Applied and Advanced Research, 3*(1), S36-S38.

Shah, K. A. (2017). Game-based accounting learning: the impact of games in learning introductory accounting. *International Journal of Information Systems in the Service Sector (IJISSS), 9*(4), 21-29. https://www.igi-global.com/article/game-based-accounting-learning/190428

Stenros, J. (2017). The game definition game: A review. *Games and culture, 12*(6), 499-520. https://doi.org/10.1177%2F1555412016655679

Tavoosy, Y., & Jelveh, R. (2019). Language teaching strategies and techniques are used to support students learning in a language other than their mother tongue. *International Journal of Learning and Teaching, 11*(2), 77-88. https://doi.org/10.18844/ijlt.v11i2.3831

Telnet, D., Brujas-Bobanovic, M., Chan, D., Chester, B., Marlow, B., Meuser, J., ... & Harvey, B. (2010). Game-based versus traditional case-based learning: comparing effectiveness in stroke continuing medical education. *Canadian Family Physician, 56*(9), e345-e351. https://www.cfp.ca/content/56/9/e345.short

Toharudin, U., Kurniawan, I. S., & Fisher, D. (2021). Sundanese Traditional Game' Bebentengan'(Castle): Development of Learning Method Based on Sundanese Local Wisdom. *European Journal of Educational Research, 10*(1), 199-210. https://www.eu-jer.com/

Volk, M., Cotič, M., Zajc, M., & Starcic, A. I. (2017). Tablet-based cross-curricular maths vs. traditional maths classroom practice for higher-order learning outcomes. *Computers & Education, 114*, 1-23. https://doi.org/10.1016/j.compedu.2017.06.004

Von Wangenheim, C. G., & Shull, F. (2009). To game or not to game? *IEEE software, 26*(2), 92-94. https://doi.org/10.1109/MS.2009.54

Widiana, I. W., Jampel, I. N., & Prawini, I. P. (2018). The effectiveness of traditional game-based communication learning activity for cognitive process dimension learning achievement. *Cakrawala Pendidikan, 37*(2), 260-269. https://smartlib.umri.ac.id/assets/uploads/files/ae6d2-14091-53132-1-pb.pdf

Yang, K. H. (2017). Learning behavior and achievement analysis of a digital game-based learning approach integrating mastery learning theory and different feedback models. *Interactive Learning Environments, 25*(2), 235-248. https://doi.org/10.1080/10494820.2017.1286099

Zlotskaya, E. M. (2016). Traditional and modern teaching methods and information technologies in L2 teaching. In Человек, общество и государство в современном мире (pp. 352-357).