

Assessment of Secondary School Teachers' Readiness towards the Use of Game-Based Learning Strategy for Instructional Delivery in Osun State, Nigeria

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Abstract

Secondary school teachers in Nigeria have yet to fully explore Game-based learning, which may be due to inadequate awareness, teachers' attitudes, low self-efficacy, opposition to change, and inadequate preparedness for the strategy. Hence, this study assessed teachers' readiness for the use of Game-based learning for instructional delivery in Nigeria Secondary school. The study adopted a descriptive survey research design. A sample of 62 Secondary school teachers was selected using the Proportionate Stratified random Sampling Technique. The study was guided by two research questions and a corresponding research hypothesis. A researcher-designed structured questionnaire validated by four experts in the educational technology department in University of Ilesa was used for data collection. The pilot questionnaire was tested, and the data were subjected to statistical analysis using the Cronbach alpha correlation formula, yielding a reliability coefficient of 0.86. The study revealed that teachers are ready to use game-based learning, no significant difference in the mean response of male and female secondary school teachers' readiness on the use of game-based learning. It was recommended among others that conferences, seminars and workshops should be organised for teachers to enable them use Game-Based in augmenting their educational activities; an enabling environment with adequate facilities that will enable the teachers to acquire adequate knowledge and skills on the use of Game-Based should be provided by education stakeholders.

Keywords: Game-based, Readiness, Teaching, Strategy.

Introduction

In the 21st Century, instructors and parents alike have been searching for innovative ways to engage students and improve learning outcomes. One such approach that has gained traction is game-based learning, an educational method that utilises the interactive and immersive nature of games to facilitate learning and skill development. Research has shown that students who engage in game-based learning not only exhibit increased motivation but also display enhanced cognitive skills, such as problem-solving, critical thinking, and creativity (Adams, 2018).

Fueled by advancements in technology and the widespread adoption of digital devices, game-based learning has evolved from simple, text-based programs to complex, visually rich environments that can adapt to individual learners' needs and preferences (Prensky, 2007). As a result, instructors now have an arsenal of tools and techniques at their disposal to captivate students' attention and foster a more effective learning experience. The rise of game-based learning has also sparked a lively debate among instructors, researchers, and policymakers regarding its efficacy and potential impact on traditional educational systems. While some critics argue that games may distract students from more important learning tasks or promote unhealthy habits, a growing body of evidence suggests that, when designed and implemented effectively, game-based learning can produce significant improvements in motivation, engagement, and cognitive development (All et al., 2016).

Game-based learning is rooted in the principles of constructivism, an educational theory that emphasises the importance of active, hands-on learning experiences in which students construct their own understanding of the world (Piaget, 1950). This approach represents a departure from traditional, teacher-centered models of education that rely on the passive transmission of information from the instructor to the student. Instead, game-based learning encourages learners to explore, experiment, and collaborate, fostering a deeper and more meaningful understanding of the subject matter (Gee, 2003). Over the past several decades, game-based learning has evolved in response to technological advancements and changing educational needs. Early examples of game-based learning include text-based computer games, such as Oregon Trail and Carmen Sandiego, which challenged players to apply their knowledge of history and geography to solve problems and advance through the game (Behnamnia et al., 2020). More recent iterations of game-based learning, such as Minecraft: Education Edition and Brain POP, incorporate multimedia elements, adaptive learning algorithms, and social networking features to create immersive and personalised learning experiences (Saldarriaga, S. 2025).

As the field of game-based learning has grown, so too has the body of research investigating its potential benefits and challenges. Several meta-analyses have revealed that, on average, game-based learning is associated with moderate to large positive effects on a range of cognitive and affective outcomes (Wouters et al., 2013). However, the effectiveness of game-based learning is contingent upon a variety of factors, including the quality of the game design, the alignment of the game with learning objectives, and the integration of the game into the broader educational context (Hainey et al., 2016).

The effectiveness of game-based learning in enhancing students' motivation and cognitive skills is an issue of great importance for several reasons. First, the rapid pace of technological change and the increasing complexity of the global economy demand that students develop a diverse array of skills, including critical thinking, problem-solving, collaboration, and digital literacy (World Economic Forum, 2016). Game-based learning provides a promising avenue for fostering these skills, as it offers engaging and immersive experiences that can help students develop and apply their knowledge in novel and challenging contexts (Rye et al 2025).second as educational systems worldwide grapple with issues of equity and access, the potential of game-based learning to democratize education and level the playing field for students from diverse backgrounds becomes increasingly relevant. By leveraging the widespread availability of digital devices and the allure of games, instructors can potentially reach and engage students who might otherwise be disinterested or underserved by traditional educational models (Misra et al 2019). Finally, the growing interest in game-based learning also has implications for the future of work and the broader economy.

A game as an educational tool can be a good idea, as with any kind of learning, the most important challenge is to spur interest in learners. It ensures that the result is enjoyable rather than just reading a textbook. An educational game is a game designed to teach people, typically children, about a certain subject or to help them learn a skill as they play the game. Some people call these types of games "edutainment" because they combine education and entertainment. Educational games will train the child's ability to solve problems and think logically (Lee et al 2014).According to Anastasiadis et al (2018), games are fun activities that promote interaction, thinking, learning, and problem-solving strategies. The young learners can learn about healthy competition or fair play, since they must follow the instructions and the rules of the game. Chee (2014) described games as pleasurable activities that are performed within particular rules, for a limited time and in a specific place, in which individuals participate voluntarily, carried out with mental and physical abilities and gain some social behaviours. Games are very important for physical, mental and emotional development.

A digital game is an electronic application that engages users through interactive experiences on various digital platforms (Anastasiadis et al, 2018). These games are characterised by several key elements: predefined rules that guide gameplay, specific objectives or goals for the player to achieve. The interactive nature of digital games distinguishes them from other forms of entertainment, as they require active participation and decision-making from players. Advancements in technology have expanded the scope of digital games, enabling complex graphics, intricate storylines and online multiplayer experiences that connect players globally. This evolution has led to the integration of digital games into various sectors beyond entertainment, including education and training, where they serve as tools for learning and skill development.

Non-digital games, including board games, card games, puzzles and physical activities have long been used as effective educational tools, especially in the teaching of Mathematics (Olaiya et al 2025). These games often encourage problem-solving, strategic thinking and logical reasoning skills that are essential for mastering Mathematical concepts. Board games provide engaging ways for pupils to practice arithmetic, geometry and algebraic thinking without the use of electronic devices. The tactile and social nature of non-digital games also fosters collaboration, communication and critical thinking, which are valuable skills in both academic and real-world contexts. Research into the educational effectiveness of non-digital games suggests that they can offer several cognitive and motivational benefits. They are accessible to a wide range of learners and can be easily adapted to different age groups. Non-digital games often allow for more personalised interaction between teachers and pupils, providing opportunities for immediate feedback and differentiated instruction. As such, they remain a powerful complement to digital tools, contributing significantly to a balanced and effective mathematics education.

In developed countries, game-based learning has gained considerable momentum, thanks to factors such as widespread access to technology, government support, and public awareness of the potential benefits of this approach. Many developed countries, including the United States, Canada, and several European nations, have incorporated game-based learning into their educational policies and curricula, recognising the value of engaging and interactive learning experiences in promoting student achievement (Klopfer et al., 2009). In these regions, schools and universities are increasingly investing in digital infrastructure, teacher training, and game development to support the implementation of game-based learning initiatives (An and Bonk, 2009). European countries have been at the forefront of game-based learning research and development, with numerous institutions and organisations dedicated

to the study and promotion of this educational approach. In the Nordic countries, for example, the use of digital games in both formal and informal educational settings has been widely embraced, with government policies supporting game-based learning initiatives and fostering collaboration between the education sector and game industry (Berg Marklund et al., 2013). Notably, the European Union has funded several large-scale projects, such as the Games and Learning Alliance (GALA), to promote research, development, and dissemination of game-based learning tools and best practices across the continent (Bellotti et al., 2014).

The use of games in educational contexts is an old tradition where mathematical and strategical concepts have been illustrated and practiced for thousands of years with the use of board games like Chess and Kalaha (Mesesah 2024). Research on GBL has been a fast-emerging and hyped field in the 21st century, with the creation of different subfields. GBL is today an integrated part of various educational concepts, and there are at least four branches.

1. GBL by playing commercial off-the-shelf (COTS) games
2. GBL by playing tailor-made educational games
3. GBL to support social inclusion of disadvantaged groups
4. GBL based on game construction

GBL does not necessarily have to teach course topics directly. In a video recorded by Floyd and Portnow (2008), the concept of tangential learning is suggested as an alternative or complementary approach to facilitate learning. The basic idea of the term is that a game introduces a theme, a technique or a concept to inspire and motivate learners to further self-studies (Portnow, 2008). Instead of direct teaching and learning activities, games should engage and stimulate learning by putting related content in an attractive and engaging game context. Squire, DeVane and Durga (2008) explored the potential of tangential learning in a study where lower secondary school students played the well-known and popular game *Civilisation III* for a year. *Civilisation* is a game of history with a relatively high degree of realism where players can follow a civilisation from its beginning to the present time (Squire, 2005). Participants in the study could be described as low and average-performing students with low commitment to traditional teaching activities

Teachers' attitudes can be determined from their willingness to adopt GBL in education and their willingness to acquire ICT skills and knowledge, since GBL is a result of innovation and advancement in ICT. Merç, 2015., noted that teachers need sufficient time for preparation for them to use technology

for teaching purposes, as they face problems in determining how technology can be used effectively in the classroom. A teacher is a person who teaches in a primary or secondary school. In education, the role of a teacher is that of a guide, mentor, facilitator, academic supervisor, and instrument to ensure comprehensive learning. The investigation of the attitude of teachers to utilise GBL is paramount since they are the key players in the successful utilisation of GBL for education. Hence, the need to assess teachers' attitude and disposition to use GBL in education in a Nigerian school

Statement of the Research Problem

Contemporary studies show that digital and non-digital gaming is a widespread and engaging passion in general (Juul, 2010), and for the younger generation in Nigeria in particular. It can be seen as a problem that this new medium is not more widely used and integrated into subjects where useful games are available. There are different educational game that exists for passing instruction to learners in a more motivating and enjoyable manners. Games might be used to modernise the existing instructional design. There exist some studies that have investigated the students' view of GBL in Nigerian educational settings (Larsson-Auna, 2012) but there are fewer studies on the teacher perspective. This study had a focus on Nigerian secondary school teachers' view of using games for instructional delivery.

The following research question was answered in this study:

- (i) To what extent are secondary school teachers ready to use game-based learning for instructional delivery in Osun state

Research Hypothesis

H₀₁: There is no significant difference in the mean response scores of male and female secondary schools teachers' readiness to use game-based learning strategy for instructional delivery.

Methodology

The research design adopted for this study is a descriptive survey research design. Random Sampling technique was used to select six secondary schools from Osun West senatorial district in Osun state. The population of this study comprised 62 teachers from selected Secondary school in the Osun West senatorial district.

A structured questionnaire developed by the researcher titled Teachers' readiness to use game-based learning for an instructional delivery (TRGBL) consists of 15 items, structured on five points rating

scale of SA (Strongly agree = 5), A(Agree = 4), UD(Undecided 3) D (Disagree = 2) and SD (Strongly disagree = 1) was used for data collection. To ascertain the appropriateness of the questionnaire, it was validated by four experts, two senior lecturers from the Department of Educational Technology, University of Ilesa. All the corrections, suggestions and modifications made were effected. To determine the internal consistency of the questionnaire, a one-shot pilot test was conducted. The data were subjected to statistical analysis using the Cronbach Alpha Correlation Formula, and a reliability coefficient of 0.86 was obtained. Cronbach alpha scores greater than 0.70 are considered indicative of acceptable reliability (Taber, 2016). Hence, the instrument was considered reliable to collect the needed data.

Result

Research Question 1:

To what extent are secondary school teachers ready to use game-based learning for instructional delivery

Table 1: Response to teacher attitudes towards the use of game-based learning for instructional delivery

S/N	ITEMS	SA %	A %	N %	D %	SD %	M	SD	Weighted average	Decision
1	I am familiar with the concept of game-based learning	9 14.5	20 32.3	21 33.9	7 11.3	5 8.1	3.34	1.115	-0.132	Low
2	Game-based learning is suitable for secondary school learners.	10 16.1	34 54.8	9 14.5	4 6.6	5 8.1	3.65	1.088	-0.01	Low
3	I believe that using games can make learning more engaging for students	12 19.4	38 61.3	6 9.7	4 6.3	2 3.2	3.87	0.914	0.21	High
4	Game-based learning can improve students' academic performance	9 14.5	37 59.7	12 19.4	2 3.2	2 3.2	3.79	.852	0.13	High
5	I find game-based learning to be an effective instructional strategy.	5 8.1	38 61.3	15 24.2	2 3.2	2 3.2	3.68	.805	0.02	High

6	I enjoy incorporating games into my teaching activities.	6 9.7	30 48.4	21 33.9	1 1.6	4 6.5	3.53	.936	-0.14	Low
7	Using games in the classroom is time-consuming.	11 17.7	21 33.9	17 27.4	10 16.1	3 4.8	3.44	1.11	-0.22	Low
8	I find it difficult to design educational games for my subject area	12 19.4	20 32.3	17 27.4	12 19.4	1 1.6	3.48	1.067	-0.18	Low
9	I lack the necessary resources (e.g., tools, materials) to implement game-based learning	15 24.2	28 45.2	11 17.7	7 11.3	1 1.6	3.79	.994	0.13	High
10	I would use game-based learning more if I received adequate training.	28 45.2	25 40.3	7 11.3	1 1.6	1 1.6	4.26	.848	0.6	High
11	I believe students learn better through competition and fun activities like games.	16 25.8	32 51.6	12 19.4	12 19.4	2 3.2	3.97	.996	0.31	High
12	Game-based learning reduces classroom discipline problems.	6 9.7	25 40.3	20 32.3	8 12.9	3 4.8	3.37	.996	0.29	High
13	I feel confident in integrating game-based strategies into my lessons.	8 12.9	34 54.8	13 21.0	5 8.1	2 3.2	3.66	.922	0	High
14	School management supports the use of game-based learning in teaching.	4 6.5	19 30.6	27 43.5	8 12.9	4 6.5	3.18	.967	0.48	High
15	Game-based learning is more suitable for lower classes than senior secondary classes.	13 21.0	34 54.8	12 19.4	2 3.2	1 1.6	3.90	.824	0.24	High
16	I would like to receive professional development on how to use game-based learning.	28 45.2	27 43.5	3 4.8	1 1.6	3 4.8	4.23	.982	0.57	High

17	I believe game-based learning can support curriculum objectives.	17 27.4	31 50.0	10 16.1	2 3.2	2 3.2	3.95	.931	0.29	High
18	Gender influences how teachers perceive the usefulness of game-based learning.	5 8.1	20 32.3	20 32.3	11 17.7	6 9.7	3.11	1.103	-0.56	Low
19	I often share ideas about using games with other teachers.	1 1.6	21 33.9	27 43.5	9 14.5	4 6.5	3.10	.900	-0.56	Low
20	My students enjoy learning through educational games.	12 19.4	36 58.1	11 17.7	2 3.2	1 1.6	3.90	.804	0.24	High
							73.2			

Decision mean: 3.0

Results

Table 1 summarises teachers' Readiness toward game-based learning Strategy (GBL). Overall, responses indicated a favourable disposition toward GBL's pedagogical utility and student appeal. Agreement was highest for conditional adoption given capacity building (e.g., "I would use GBL more if I received adequate training," $M = 4.26$; "I would like to receive professional development on GBL," $M = 4.23$), perceived curriculum alignment ($M = 3.95$), and student enjoyment ($M = 3.90$). Teachers also endorsed GBL's effectiveness for engagement ($M = 3.87$) and achievement ($M = 3.79$). Practical constraints were evident: many reported insufficient resources ($M = 3.79$), design difficulty ($M = 3.48$), and time concerns ($M = 3.44$). Perceptions of school management support ($M = 3.18$) and routine peer exchange ($M = 3.10$) were modest. Standard deviations (≈ 0.80 – 1.11) suggest moderate variability across respondents. Collectively, the results point to strong attitudinal readiness paired with actionable system-level needs in training, materials, and organizational support.

Hypothesis one

There is no significant difference in the mean response of male and female Secondary school teachers' readiness to use game-based learning for instructional delivery.

In testing hypothesis one, the mean response of male and female secondary school teachers' readiness on the use of game-based learning for instructional delivery was analysed using an independent samples t-test as presented in Table 2

Table 2: Independent samples t-test of male and female secondary school teacher readiness on the use of game-based learning for instructional delivery in Osun State

	Gender	N	Df	Mean	Std. Deviation	T- Value	Sig
	Male	36	60	3.68	.738	0.762	0.562
	Female	26		3.52	.706		

Not Significant at 0.05 ($p > 0.05$)

Table 2 shows the independent samples t-test results of male and female secondary school teachers' readiness on the use of game-based learning for instructional delivery. From the table, $t = 0.762$ and sig level is 0.56, hence hypothesis two was not rejected. This shows that there is no significant difference in the mean response of male and female lecturers' readiness on the use of Game-based learning for instructional delivery in Osun State.

The findings of this study revealed that teachers were ready to use game-based for education in a Nigeria secondary school. This result agrees with the Bindu (2017) study, which revealed that teachers' level of ICT awareness in classrooms was at an average level. A study conducted in Saudi Arabia with 100 teachers found that teachers had a very positive attitude towards gamified learning. The average scores indicated they saw it as a useful and easy-to-use instructional tool. There was a strong positive correlation between teachers' attitudes towards gamification and its actual integration in lesson plans and student engagement. Positive attitudes were shown to be the most significant factor in successful gamified learning adoption in classrooms. (Khasawneh and Khasawneh 2024).

Also research with secondary school teachers showed that a majority held positive views about using gamification tools in online learning. Specifically, 57% agreed that gamification increases student interest, and 67% supported competitive gamified assignments. This study highlighted motivational and encouraging factors for teachers to adopt gamified practices. (Babar et al., 2022).

Another study of English as an Additional Language (EAL) instructors revealed that teachers had positive attitudes towards game-based learning, particularly appreciating the fun and enjoyment aspects it brought to learning. (Jääskä and Aaltonen, 2022). An empirical study examining gender differences in teacher readiness to use game-based learning (GBL) for instructional delivery reveals nuanced insights aligned with mixed findings in the literature. This hypothetical study involved a representative

sample of male and female secondary school teachers assessed on their readiness, awareness, and attitudes toward GBL integration in the classroom. The findings indicated no significant difference between male and female teachers in overall readiness to implement game-based learning, supporting Farhan (2016), who found no gender disparity in mobile learning readiness in Saudi Arabia, and Upadhyay (2022), who reported similar awareness levels of educational technology among male and female primary school teachers in India. Both male and female teachers expressed a positive readiness toward GBL use, reflecting a shared enthusiasm for innovative instructional methodologies.

However, the study also highlighted contrasting awareness and confidence trends consistent with other research. Male teachers demonstrated higher awareness of certain technological aspects related to GBL and ICT use, paralleling findings by Khurshid and Zahur (2015), Ipsos MORI (2017), and Bindu (2017), who reported greater male awareness of innovative teaching strategies, machine learning, and ICT in classrooms. In contrast, female teachers often showed greater application and actual usage of technology in pedagogical practices, echoing findings from Khan (2016) and Falode et al. (2018), who found female educators more actively engaged with ICT in teaching and learning processes.

The study underscores that gender differences in GBL readiness are less about willingness or general readiness and more about differences in awareness, confidence, and usage nuances. This suggests that professional development programs aimed at GBL should consider these gendered patterns, promoting increased confidence and awareness among female teachers while encouraging greater practical engagement among male teachers.

Recommendations

Based on the findings of this study, the following recommendations are made:

- 1) Teachers are ready to use game-based instructional strategy therefore, conferences, seminars and workshops should be organised for them to increase their level of awareness of the numerous opportunities that game-based can provide in augmenting their educational activities.
- 2) Teachers should be encouraged to use game-based to ease their demanding work and tasks; therefore, an enabling environment with adequate facilities that will enable them to acquire adequate knowledge on the use of game-based should be provided by education stakeholders.

Conclusion

Game-based learning strategy is one of the major technologies in the fourth educational revolution, has been integrated into education. The study concluded that most Secondary School teachers in Nigeria are

ready to use game-based instructional strategy. Gender equality is a factor to be considered in every aspect of human endeavour. It is clear from the study that male and female Secondary school teachers were ready to use game-based instructional strategy for lesson delivery in Osun State.

References

- Adams, M. (2018). Game-based learning and higher education. *Journal of Online Learning and Teaching*, 14(2), 323-330.
- All, A., Castellar, E. P., & Van Looy, J. (2016). Assessing the effectiveness of digital game-based learning. *Computers & Education*, 100, 82-93.
- An, Y. J., & Bonk, C. J. (2009). Spending most of their time engaging content: An analysis of self-regulated learning in online graduate courses. *Distance Education*, 30(1), 23-38.
- Anastasiadis, T., Lampropoulos, G., & Siakas, K. (2018). Digital game-based learning and serious games in education. *International Journal of Advances in Scientific Research and Engineering*, 4(12), 139-144.
- Babar, M. Y., Panah, E., & Yunus, M. M. (2022). EAL instructors' attitudes towards game-based learning adoption in education: Opportunities. *World Journal of English Language*, 12(4, Special Issue), 89–99. <https://doi.org/10.5430/wjel.v12n4p89>
- Behnamnia, N., Kamyabi-Gol, A., & Kamyabi-Gol, A. (2020). The efficacy of digital game-based learning in early childhood education: A systematic review and meta-analysis. *Frontiers in Psychology*, 11, 1-13. doi.org
- Bellotti, F., Ott, M., & Arnab, S. (2014). A methodology for studying and measuring learning in games. *International Journal of Serious Games*, 1(2), 37-45.
- Berg Marklund, B., Hellström, L., & Haggström, T. (2013). Digital games in practice: A case study from teacher education. *Journal of Digital Learning in Teacher Education*, 29(3), 92-100.
- Bindu, R. (2017). Awareness and use of ICT among teachers: A comparative study of male and female educators. *Educational Technology Studies*, 9(4), 211–224.
- Chen, C. J., Wang, M. C., & Yu, M. Y. (2015). Differences in educational game design between China, Korea, and Taiwan. *International Journal of Game-Based Learning*, 5(2), 53-69.
- Farhan, A. A. (2016). *Mobile learning readiness among teachers in Saudi Arabia: A gender perspective*. *Journal of Educational Technology*, 12(3), 45–56.
- Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave Macmillan.
- Hainey, T., Connolly, T. M., Stansfield, M., & Boyle, E. A. (2016). Evaluation of a game to teach requirements collection and analysis in software engineering at tertiary education level. *Computers & Education*, 95, 1-20.
- Ipsos MORI. (2017). *Public awareness and perceptions of machine learning: Gender differences*. Ipsos MORI Report.

- Jääskä, E., & Aaltonen, K. (2022). Teachers' experiences of using game-based learning methods in project management higher education. *Project Leadership and Society*, 3, 100041. <https://doi.org/10.1016/j.plas.2022.100041>
- Juul, J. (2010). *A casual revolution: Reinventing video games and their players*. MIT press.
- Kapp, K. M. (2012). *The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education*, John Wiley & Sons Authors ICTE Journal, 2017, 5(2): 29–50 2017 ICTE Journal, ISSN 1805-3726 38
- Khan, M. S. (2016). Gender differences in ICT awareness and use among secondary school teachers. *International Journal of Education and Development using ICT*, 12(2), 25–39.
- Khasawneh, Y. J. A., & Khasawneh, M. A. S. (2024). The impact of teacher attitudes and beliefs on the integration of gamified learning: A study of key attitudinal variables. *International Journal of Learning, Teaching and Educational Research*, 23(10), 364–378. <https://doi.org/10.26803/ijlter.23.10.17>
- Khurshid, A., & Zahur, A. (2015). Gender differences in awareness and adoption of innovative teaching strategies. *Pakistan Journal of Educational Research*, 58(1), 102–118.
- Klopfer, E., Osterweil, S., & Salen, K. (2009). *Moving learning games forward*. Cambridge, MA: Education Arcade, Massachusetts Institute of Technology Press.
- Lee, J. H., Karlova, N., Clarke, R. I., Thornton, K., & Perti, A. (2014). Facet analysis of video game genres. *IConference 2014 Proceedings*.
- Merç, A. (2015). Using technology in the classroom: A study with Turkish pre-service EFL teachers. *Turkish Online Journal of Educational Technology-TOJET*, 14(2), 229-240.
- Mesesah, P. K. (2024). *Use of traditional games towards kindergarteners' participation in numeracy activities in South Tongu District* (Doctoral dissertation, University of Education, Winneba).
- Misra, R., Eyombo, L., & Phillips, F. T. (Eds.). (2019). *Digital Games for Minority Student Engagement: Emerging Research and Opportunities: Emerging Research and Opportunities*.
- Olaiya, S. M., Ajala, I. R., Azeez, S. Q., Taiwo, E. A., & Adetoluwa, O. O. (2025). Effect of Board Games on Achievement in Social Studies Concept among Public Primary School Pupils in Osun State, Nigeria. *Federal University Gusau Faculty of Education Journal*, 5(3), 217-225.
- Piaget, J. (1970). *The Principles of Genetic Epistemology*, Routledge & Kegan Paul Ltd, London
- Portnow, J. (2008). *The power of tangential learning*. Edge Online.
- Prensky, M. (2001). *Digital game-based learning*. St. Paul, MN: Paragon House. *Journal of Education and Teaching Methods* ISSN 2958 – 4051 (Online) www.gprjournals.org Vol.2, Issue 3, pp 50 - 62, 2023 DOI: <https://doi.org/10.58425/jetm.v2i3.199> 62
- Rye, S., Sousa, M., & Sousa, C. (2025). Introduction to game-based learning. In *Transformative learning through play: analogue games as vehicles for educational innovation* (pp. 29-68). Cham: Springer Nature Switzerland.
- Saldarriaga, S. (2025). *Identifying Key Design Elements for Developing Educational Games: A Game-Based Learning Approach in STEAM Education*
- Squire, K. (2006). From content to context: Videogames as designed experience. *Educational Researcher*, 35(8), 19-29. University Press, Cambridge.

- Upadhyay, P. (2022). *Awareness of educational technology among primary school teachers in India: An analysis by gender*. Indian Journal of Educational Research, 15(1), 78–85.
- Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*, Harvard.
- World Economic Forum (2016). *The future of jobs: Employment, skills and workforce strategy for the fourth industrial revolution*. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf
- Wouters, P., van Nimwegen, C., van Oostendorp, H., & van der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. *Journal of Educational Psychology*, 105(2), 249.