TEACHERS' PERCEPTION OF DIGITAL GAME-BASED LEARNING IN EARLY CHILDHOOD EDUCATION IN RURAL SCHOOLS IN GHANA

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Abstract

Digital game-based learning (DGBL) is increasingly being used as a teaching methodology to engage learners in the learning processes. The limited usage of digital game-based learning (DGBL) in rural education in Ghana has motivated this study. This study investigates the use of DGBL in early childhood education (ECE). Specifically, the study sought to examine rural teachers' perspectives of DGBL. The study adopted a quantitative data-gathering method. Questionnaires were administered to sixty-five (65) early childhood rural teachers and 62 responses were received. The analysis revealed that most rural teachers who do not employ DGBL in ECE classrooms do not have the prerequisite knowledge, and view DGBL as a distractive technique that hinders students learning. The consequences of these findings from the viewpoints of ECE rural teachers suggest that the government must support rural teachers in using DGBL through professional development programmes.

Keywords: Digital game-based learning, computer devices, early childhood education, rural education, digital games.

1. Introduction

Recently, there has been growing interest in Digital game-based learning (DGBL) in early childhood development (ECD). Studies indicate that DGBL has the potential to increase engagement and learning. However, it is still unclear how rural ECE educators perceive its use in the classroom. DGBL is an approach to teaching using games via digital technologies such as video game consoles, tablets, iPads, Chromebooks, or smartphones (Sánchez-Mena et al., 2019). DGBL can ideally be adapted to offer realistic scenarios, teach sophisticated reasoning abilities, assist in diverse learning methods, and promote cooperation and ingenuity (Roodt & Ryklief, 2019). DGBL can include play and offer replicated environments for learning and assessment, according to Rüth et al.(2022). DGBL provides for social growth while also encouraging players to practice critical thinking and problem-solving techniques (Yang & Lu, 2021). DGBL offers continuous, real-time feedback (Kaimara et al., 2022), chances to participate (Chen & Wolf, 2021), and motivation to learn new things (Hartt et al., 2020).

Although there have been numerous studies on the educational and motivating benefits of DGBL, there are still no instances of teaching with DGBL in Ghana's rural ECE. DGBL for learning in particular and technology integration, in general, may be hindered by unfavorable teacher attitudes and the low competence of rural teachers to assist young learners in using this approach (Yang & Lu, 2021). Hence this paper concentrated on teachers' perspectives, notably on Ghana's rural ECD teachers' attitudes, and factors that influence their intention to utilize DGBL.

To this end, the paper explores ECD teachers' perspectives of DGBL in rural schools in Ghana to better understand the influence that DGBL could have on ECD. We purposefully did not define the term DGBL for the instructors since we were curious about what they would consider a game to be and what games were being used in the classroom. Our investigation was framed by the following research query: What are teachers' perceptions of digital game-based learning regarding student engagement, learning motivation, and cognitive learning outcomes?

In the following sections, we first provide a brief overview of the related literature, followed by the research methodology. We then focus on the results and discussion thereof. We conclude by discussing implications for practice for teachers in rural schools in early childhood development (ECD).

2. Literature review

2.1. Effects of DGBL

Claims concerning the consequences of using DGBL in formal learning environments can often be divided into two categories: cognitive learning consequences and motivational learning consequences.

Learning factual knowledge, cognitive skills, and meta-cognitive skills are only a few examples of different cognitive learning outcomes (Chen & Wolf, 2021). In this investigation, we focused on two motivational facets: 1) Teachers who might have used DGBL (for teaching), and 2) teachers who are motivated to teach and have a positive attitude regarding its application in classroom settings. When Yang and Lu (2021) conducted a meta-analysis of 39 studies comparing teachers using serious games (games where the entertaining quality is used for a serious purpose, like education or health) with traditional teaching methods, they discovered that serious games were more effective in terms of teaching knowledge and cognitive abilities. These results are consistent with those of the study by Kaimara et al., (2022). Additionally, the results of the study by Rüth et al., (2022) demonstrate that playing games had favorable benefits on student engagement, but the results supporting the effects on motivation to learn were unclear.

Several authors (for example, Bado, 2022) propose soft skills or communicative skills as potential results of engaging in DGBL in addition to teaching and learning with DGBL. For example, Chen and Wolf, (2021) claim that learners not only understand the subject matter, but they also gain general abilities, like teamwork or introspective skills when they use DGBL to learn. Furthermore, according to Yang and Chen (2020), students who build games gain knowledge about game design as well as practical design skills and "reached a level of introspection that went above traditional learning and thinking" (p.12). Hartt et al., (2020) further emphasized that learning benefits go beyond the abilities and comprehension of game design. They showed that pupils enhanced their digital literacy and participation in the design process while developing scientific microgames (short games). According to Görgen et al., (2020) students who master games feel compelled to make their playing aesthetically pleasing, entertaining, and accurate. The learners also learned how to challenge and explain their expertise (Chen & Wolf, 2021). Yang and Lu, (2021) discovered that students playing DGBL were more motivated and employed higher-level cognitive processes than students who do not play.

2.2. Perceptions and experiences of teachers for teaching with DGBL

The perspectives and experiences of teachers with game-based learning may have a significant impact on whether the usage of DGBL truly results in positive learning and motivating effects. Several studies (for example, Kaimara et al., 2021; Yang & Lu, 2021) have investigated educators' perceptions of using DGBL in the classroom. Three common aspects were noted in these studies: 1) The value of utilizing DGBL in the classroom, 2) the challenges of using DGBL in the classroom, and 3) the acceptance of using DGBL in the classroom by instructors. We concentrated on the first component in the current study because it is potentially a prerequisite for the other two, as this paper is part of a larger PhD study.

The main justification given by teachers for adopting digital games in the classroom is to increase student motivation (Kaimara et al., 2022). Teachers also indicated that the development of students' cognitive abilities and knowledge as reasons for utilizing (or desiring to utilize) DGBL in their classroom settings (Görgen et al., 2020: Rüth et al., 2022). The intentions of teachers to employ DGBL is most directly impacted by their attitudes toward learning opportunities (Rüth et al., 2022). However, most of the participants in these studies were either teachers who do not currently teach with DGBL or teachers who do so just when necessary for a specific study project.

3. Method

A quantitative approach was used to gather data quickly to obtain teachers' awareness and levels of competence in the use of digital technologies.

Sixty-two (62) teachers, who represented 10 rural schools in Ghana's Greater Accra Region, were selected to participate in the study. These teachers taught either kindergarten (grades one and two) or ECD phase. Because these teachers' impressions of the usage of digital games in their teaching practice are based on their personal experience, we purposefully chose rural schoolteachers who might use or not use DGBL in the classroom.

A questionnaire was administered to teachers in the 10 schools to obtain their opinions on integrating DGBL in their lessons. The questionnaire was made up of open-ended questions that covered a wide range of topics related to using games in the classroom, including the games used, the educational objectives that were covered, the activities that the students and teacher engaged in, the perceived outcomes, and the teachers' overall views on teaching with DGBL.

SPSS version 28 was used to analyse the data, which were collected as measurable percentages and numbers. Descriptive analyses were performed to answer the research questions.

4. Findings

Since there were typically no variations based on the type of education, we discuss the results for all forms of rural ECD education collectively. This section presents descriptive and reliability analyses of the study's variables. It is clear from table 1 that most of the teachers have been teaching for more than five years. Hence, their teaching experience qualifies them to be participants in the study.

Table 1. Profile of participants.

Gender	Frequency	Age	Frequency	Years of teaching experience	Frequency
Female	33	18 -25	13	4	6
Male	29	26-30	21	5	9
		31-35	15	6	18
		36-40	6	7	17
		41-45	4	8	12
		46 and above	1		

Table 2. Perception of the use of technology in education.

Items of descriptions-Perceptions	Disagree/ Strongly disagree	Neutral	Agree/ Strongly Agree	% disagree/ strongly disagree	Mean	Std Deviation
Technology is important in education	35	12	15	65.5	2.56	1.210
The technology could be used to enhance teaching and learning	36	6	20	58.0	2.53	1.352
Technology has a role in the classroom	35	12	15	56.4	2.50	1.264
Technology can be used as a tool in assisting young learners to learn math and English literacy	32	15	15	51.6	2.53	1.264
Cronbach's Alpha						**.770**

The four items of measurement for the perceptions of the use of technology in education yielded a measure of consistency: Cronbach alpha of 0.770, which is an acceptable measure of reliability (Mishra et al., 2019). From table 2, it can be seen that 65.5% of the respondents disagreed with the fact that technology is important in education today, while only 6.5 strongly agreed with the statement. Also, worth noting is the low percentage (6.5%) of the respondents indicated they strongly agreed that technology has a role in the classroom. Interestingly, only 8.1% of respondents also agreed that technology might be utilized to help young students acquire math and English literacy.

Table 3. Perception of the value of DGBL in the classroom settings.

Items of descriptions-Perceptions	Disagree/ Strongly disagree	Neutral	Agree/ Strongly Agree	% disagree/ Strongly disagree	Mean	Std. Deviation
use DGBL as a tool in my classroom to motivate young learners	65	12	12	61.2	2.50	1.170
DGBL can improve the learning skills of young learners in the classroom	40	13	10	62.9	2.52	1.302
DGBL can help improve the cognitive skills of young learners	44	10	8	71.0	2.35	1.332
DGBL can motivate young learners in learning complex topics	45	8	10	72.6	2.10	1.211
DGBL can create fun for young learners while learning	43	8	11	69.3	2.18	1.261
DGBL has a role to play in rural ECD community schools	46	8	8	74.2	2.16	1.296
DGBL can be used to supplement the traditional mode of teaching and learning	44	11	7	70.9	2.40	1.247
Cronbach's Alpha						.896

Table 3 shows an overview of the frequencies of levels of agreement for the items of measurement. The seven items of measurement for the perception of DGBL in the classroom produced a Cronbach alpha of 0.896 which is an acceptable measure of reliability (Mishra et al., 2019).

From table 3, we can see that 62.1% of the respondents disagreed with the statement that they use DGBL as a tool in the classroom to motivate young learners, while 6.5% of the respondents strongly agreed to the statement that they use DGBL as a tool in the classroom to motivate young learners. Worth noting is the high percentage (71%) of respondents that disagreed that they could use DGBL to help students improve their cognitive skills. Finally, 74.2% of the respondents disagreed that DGBL has a role to play in rural ECD community schools. Majority disagreeing to the fact that DGBL could play role in ECD is not a good sign for rural education in Ghana.

5. Discussion

Noteworthy viewpoints from teachers on the application of DGBL in Ghana's rural ECD were explored. In addition to orchestrating and integrating the DGBL, as previous research on DGBL in education has shown, the teacher's role is crucial for the implementation of DGBL in ECD. This study demonstrates that teachers' viewpoints and decisions about whether to utilize games in the classroom are crucial. The similarities between public and private rural ECD schools served to emphasize the significance of the teacher's involvement in the application of DGBL. However, and this is crucial to note, the importance of DGBL and the role of the instructor are not just tied to the usage of DGBL in the classroom. Rather, it alludes to the broader use of technological resources. The findings showed that teachers made connections between DGBL, general DGBL technologies, and the digitalization of education. More precisely, the few educators that support the usage of DGBL agreed to the fact that the importance of educating students on how to function in a technologically advanced world and the utilization of electronic content like DGBL to facilitate this is crucial. Most of the teachers who had reservations about using DGBL also showed mistrust of technology in general and a reluctance to employ technological tools in ECD education. It has become clear that teachers' viewpoints are important not only when discussing DGBL but also while discussing the overall utilization of technology in the rural educational setting. Appreciation and even prioritizing the importance of teachers is necessary when it comes to the multiple efforts being made by education policy to advance technology and introduce a new pedagogy of digital technologies in classrooms. Teachers' voices should be given prominence and work to improve professional learning. Future learning and teaching methods in the educational system will indeed be altered by DGBL. The findings also revealed the unimaginativeness of teachers in integrating DGBL with young learners. DGBL is not thought to help accomplish learning objectives by rural teachers, according to the selection criteria.

The findings are consistent with other studies from developed nations and urban schools in Ghana regarding the obstacles to using DGBL, which show a lack of time, technological equipment, training, and information. Also, parents' views on DGBL, as well as the encouragement and assistance from colleagues, appear to have an impact on whether and how much teachers will use DGBL in their classes. This suggests that teachers' views may be crucial, but they must be in line with those of the other ECD stakeholders. The Greater Accra region of Ghana was the study's focus, therefore its interest in technological innovation in education may differ from the interests of other parts of the nation concerning DGBL.

Discourse about using traditional play to learn in formal education has been supplanted by discussions about teaching with technology and digital tools. DGBL might be viewed from this angle as just another teaching tool or digital tool that was previously less well-liked but is now becoming more well-liked because of new development in schools in Ghana. However, the justifications for using DGBL in schools are like those for using traditional play in the classroom, and it can be predicted that instructors' attitudes would not alter greatly. The discourse around the many technology trends that develop over time in formal educational settings, as well as instructors' attitudes and use of them, need to be compared in further research. This study recommends that teachers are given training on emerging technologies to be abreast with using technology in their classroom. The government should set up computer laboratories in rural schools to assist in the use of DGBL by teachers in classroom settings.

6. Implications and conclusion

The study set out to determine ECD teachers' attitudes and practices towards using DGBL. The findings show that most teachers do not support the idea of using DGBL and have no or little knowledge of the benefits of DGBL. A possible interpretation of this finding is that ECD rural teachers do not have the requisite skills and competencies to integrate DGBL in the rural classroom in Ghana. The findings of this study are subject to at least limitations. First, the results are based solely on rural ECD teachers' perceptions of using DGBL in rural ECD classrooms in Ghana. Hence, a possible bias exists, as in all anonymous surveys, the respondents may not give accurate information. The results must, therefore,

be interpreted with caution. Second, the self-recruitment of the sample may have resulted in less representativeness and thus less generalisability of the results. Still, the size of the sample and their diversity in demographic characteristics (age, gender, districts ECD settings) are satisfactory for the study, and therefore the results of the study are assumed to give a realistic indication of Ghanaian ECD teachers' perceptions of the value of DGBL in the classroom settings.

To ensure rural ECD teachers' use of DGBL in the classroom settings, training, and seminars are to be organized regularly for the teachers on emerging technologies in education today. It is also important for the government through the MoE to provide teacher professional development programmes that support with not only technological tools, also the pedagogical aspect of DGBL in the classroom.

References

Bado, N. (2022). Game-based learning pedagogy: a review of the literature. *Interactive Learning Environments*, *30*(5), 936-948. https://doi.org/10.1080/10494820.2019.1683587

Chen, S., & Wolf, S. (2021). Measuring the Quality of Early Childhood Education in Low- and Middle-Income Countries. *Frontiers in Psychology*, *12*(October), 1-6. https://doi.org/10.3389/fpsyg.2021.774740

Görgen, R., Huemer, S., Schulte-Körne, G., & Moll, K. (2020). Evaluation of a digital game-based reading training for German children with reading disorder. *Computers and Education*, *150*(September 2019). https://doi.org/10.1016/j.compedu.2020.103834

Hartt, M., Hosseini, H., & Mostafapour, M. (2020). Game On: Exploring the Effectiveness of Game- based Learning Game On: Exploring the Effectiveness of Game-based Learning. *Planning Practice & Research*, *00*(00), 1-16. https://doi.org/10.1080/02697459.2020.1778859

Kaimara, P., Fokides, E., Oikonomou, A., & Deliyannis, I. (2021). Potential Barriers to the Implementation of Digital Game-Based Learning in the Classroom: Pre-service Teachers' Views. *Technology, Knowledge and Learning*, *26*(4), 825-844. https://doi.org/10.1007/s10758-021-09512-7

Kaimara, P., Fokides, E., Oikonomou, A., Education, T., & Deliyannis, I. (2022). *Pre-service teachers' views about the use of digital educational games for collaborative learning*. Education and Information Technologies, 27, 5397-5416. https://doi.org/10.1007/s10639-021-10820-9

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, *22*(1), 67-72. https://doi.org/10.4103/aca.ACA_157_18

Roodt, S., & Ryklief, Y. (2019). *Using Digital Game-Based Learning to Improve the Academic Efficiency of Vocational Education students*. International Journal of Game-Based Learning (IJGBL), *9*(4), 45-69. https://doi.org/10.4018/IJGBL.2019100104

Rüth, M., Birke, A., & Kaspar, K. (2022). Teaching with digital games: How intentions to adopt digital game-based learning are related to personal characteristics of pre-service teachers. *British Journal of Educational Technology*, *53*(5), 1412-1429. https://doi.org/10.1111/bjet.13201

Sánchez-Mena, A., Martí-Parreño, J., & Aldás-Manzano, J. (2019). Teachers' intention to use educational video games: The moderating role of gender and age. *Innovations in Education and Teaching International*, *56*(3), 318-329. https://doi.org/10.1080/14703297.2018.1433547

Yang, J. C., & Chen, S. Y. (2020). An investigation of game behavior in the context of digital game-based learning: An individual difference perspective. *Computers in Human Behavior*, *112*, 106432. https://doi.org/10.1016/j.chb.2020.106432

Yang, K. H., & Lu, B. C. (2021). Towards the successful game-based learning: Detection and feedback to misconceptions is the key. *Computers and Education*, *160*(March 2020), 104033. https://doi.org/10.1016/j.compedu.2020.104033