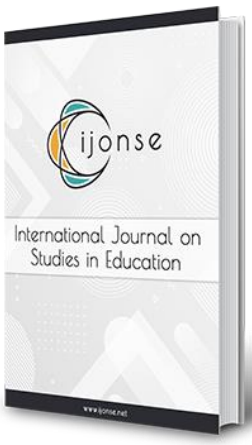

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The Effectiveness of Contextualized Digital Game-Based Learning Resource in Improving Kindergarten Pupil's Alphabet Knowledge Level

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Abstract

The achievement of pupils in their future studies depends on their reading skills. One of the strongest foundations in reading success includes alphabet knowledge. Nowadays, the utilization of information communication technology (ICT) influences young children's learning and emergent literacy skills. Hence, this study explored the effectiveness of digital game-based learning resource in improving pupils' alphabet knowledge specifically on vowels. An alphabet knowledge checklist on vowels was used to collect the data. One key finding from the study is that most of them have fair alphabet knowledge of vowels with an overall pre-test mean score of 17.91. Findings revealed that interactive learning resource was effective as reflected by a substantial increase of 8.95 points. The t-test for paired samples results in a t-value of -10.11 and a p-value of 0.000. Thus, the difference between the posttest and pretest is significant. Hence, digital game-based learning resource is an effective non-print instructional material in kindergarten for the improvement of alphabet knowledge on vowels. The study recommends the creation of contextualized digital game-based learning resource using consonants to further validate the result. A similar resource may also be suggested to other grade levels to confirm its effectiveness in improving alphabet knowledge.

Introduction

The effect of ICT has been studied extensively in recent years. In the teaching and learning process, the integration of computers in the educative process is a move that every school must embrace to become relevant in the present times (Barrera, et al., 2020). Recently, there has been wide interest in using ICT for the improvement of child's learning. Specifically, digital game-based learning has been the most extensively studied.

In primary education, the integration of technology is very crucial. Since it is the first phase of education, it typically provides foundational knowledge and skills for students to use for the rest of their academic careers (Hainey et al., 2016). Studies have shown that if a student is incapable to comprehend the basic knowledge they are trained in primary education, their secondary level education becomes more difficult, having a negative influence on their future academic lives and career opportunities (Hainey et al., 2016; Kiili, et al., 2015).

Consequently, suitable teaching methods, comprising the use of contextualized digital game-based learning resource, are desirable to improve students' engagement in primary education.

Several studies have recognized that digital game-based learning in primary education has many potential benefits, such as empowering students to take desire in learning (Kyriakides et al., 2016), allowing teachers to deliver students instant feedback (Bragg, 2012; Beserra, et al., 2014), improving students' participation, and inspiring them to discover the unknown (O'Rourke et al., 2017; Lotherington & Ronda, 2009).

As defined, digital game-based learning does not denote the game. Rather, it is a classification of instruction ruled by directions and measurable outcomes (Pho & Dinscore, 2015; Plass, et al., 2015; Al Fatta, et al., 2019). It is also an interactive learning experience that integrates educational content into game activities and can be utilized in almost all topics (Siew, 2018; Lucht & Heidig, 2013). Similarly, digital game-based learning stimulates the students' inquisitiveness, keenness, and creativity which allows them to construct ideas (Boyle, 2011). Given these benefits, digital game-based learning can additionally offer an opportunity to progress enthusiasm and experiential learning among students (Sutton & Jorge, 2020).

The study of Abdulrahim & Mabrouk (2020) suggests that digital learning like digital game-based learning can still advance the learning product of the students and enrich the competencies of educators in the classrooms. Similarly, numerous studies have exposed the noteworthy effects of digital game-based learning on emerging 21st-century skills among students (Qian & Clark, 2016; Perrotta, et al., 2013; Al Fatta, et al., 2019; Ariffin & Alan Oxley, 2014). With combined educational content, digital game-based learning captures students' attention, nurtures a positive attitude to learning, increases students' interest and engagement, and contributes to the growth of thinking skills connected to solving specific problems (Bragg, 2012; Beserra et al., 2014; Kyriakides et al., 2016; Lotherington & Ronda, 2009).

Abundant literature existed on digital game-based learning in terms of educational instruction, close-fitting its significance in the field of education. For numerous eras, the studies of Lotherington & Ronda, 2009; Warren et al., 2009; Fogel et al., 2010; Bragg, 2012; Vélez-Agosto & Rivas-Vélez, 2018; Wong, et al., 2017; Baytak & Land, 2011, have scrutinized the use of a diversity of digital games in primary classrooms, and their efforts make a decent case for using digital game-based learning in primary education. Hwang and Wu (2012) studied the tendencies in digital game-based learning research from 2001 to 2010 and testified an upsurge in research papers on employing digital game-based learning for young children specifically on the primary level. Current analyses of the effectiveness of digital game-based learning in primary education have specified that it has countless potential benefits for both learning and teaching in the following subjects: arithmetic (Kyriakides, et al., 2016; Bragg, 2012; O'Rourke, et al., 2017), second language education (Lucht & Heidig, 2013; Vélez-Agosto & Rivas-Vélez, 2018), science and arts (Fokides & Chachlaki, 2019; Pareto, et al., 2012), physical education (Hansen & Sanders, 2010; Yüksel & Tuncel, 2017), history and geography (Lotherington & Ronda, 2009), writing (Warren et al., 2009), and programming (Asad, et. al, 2016).

Digital game-based learning also delivers a chance for the students to obtain sets of skills like critical thinking,

cognitive, and problem-solving skills to aid them to realize their explicit learning goals (Talib et al., 2019). Moreover, fragments of said literature recognized a variety of courses or subjects, that present noteworthy verdicts of digital game-based learning. Talib et al. (2019) recommended that digital game-based learning should be integrated into various subjects to improve cognitive skills for better efficiency. It offers a non-threatening environment in which erroneous answers are not viewed as mistakes but as steps in gaining a better understanding of problems and concepts (van den Heuvel-Panhuizen, et.al, 2013; Lucht & Heidig, 2013; Fokides, 2018). In this sense, digital games can also accelerate the achievement of learning outcomes in primary education while providing enjoyment benefits (Kyriakides et al., 2016; Lucht & Heidig, 2013; Vélez-Agosto & Rivas-Vélez, 2018; Siew, 2018). Furthermore, digital game-based education stimulates the teaching and learning process, permitting state-of-the-art teaching procedures that enrich students' learning experiences (Campos et al., 2020). Despite the growing role of technology in education, research has studied the deep effect of *contextualized* digital game-based learning on young children. Hence, it is of interest to study contextualized digital game-based learning resource and their effect on the alphabet knowledge level among kindergarten pupils.

Research Questions

1) What is the pre-test mean score on pupils' alphabet knowledge?
2) What is the post-test mean score on the pupil's alphabet knowledge?
3) Is there a significant difference between the pre-test and post-test mean scores of alphabet knowledge of kindergarten learners before and after exposure to contextualized digital game-based learning resource?

Research Hypothesis

The research hypothesis below was tested at the 0.05 level of significance expressed in the alternative form: *There is a significant difference between the pre-test and post-test mean scores of alphabet knowledge of kindergarten learners before and after exposure to a contextualized digital game-based learning resource.*

Method

This study adopted a descriptive and experimental research design. The population of the study consisted of twenty-two (22) Kindergarten pupils of Camp 1 Elementary School, Maramag I District, Division of Bukidnon, Philippines. A convenience sampling technique was used to select the said respondents.

Data Gathering Instruments

Digital Game-Based Learning on Vowels. The instructional material used in this research was contextualized digital game-based learning. This is a teacher-made non-print learning resource that made use of Microsoft PowerPoint. Illustrations were originally illustrated and contextualized by the researcher. In addition, the game-based learning resource made use of appropriate animations and interactivity that enhance the presentation of

the content through Adobe Photoshop. This digital game-based learning resource focused on teaching vowels.

Specifically, it aimed to attain the following competencies and its competency code found in Kindergarten Curriculum Guide: (a) name the letters of the alphabet; (b) match an upper to its lower-case letter, and (c) give the name of objects whose names begin with a particular letter of the alphabet. The said contextualized resource used Sinugbuanong Binisaya, a mother-tongue language used in Bukidnon, Philippines. It is composed of seven parts.

- First is the introduction. It highlighted the character of the game who is "Super C". The said character sets the tone and objectives of the game.
- The second part is the phonics drill on the different objects starting with the five vowels (Aa, Ee, Ii, Oo, Uu).
- The third part of the resource is about activities in identifying the beginning sound of objects. If the pupil clicks the correct letter sound, a slide will pop out which says "*Sakto Ka! (You're Right)"* and the correct letter sound with its picture shows. On the other hand, if the pupil clicks the wrong letter sound, another slide will pop out containing the phrase "*Oops! Sulayi Pag-usab* (*Oops, try again*)" and then the pupils were redirected to the previous question.
- The fourth part displays the activity of naming objects whose names begin with a particular letter of the alphabet specifically vowels. The pupils click one correct object on the set of pictures on the leaves of the tree corresponding to the letter found at the tree's trunk.
- The fifth part is all about matching an upper-case letter to its lower-case letter. The pupil selects and clicks the lower-case letters below the upper-case letter alongside a clue picture.
- The sixth part shows the activity of matching lower-case letters to their upper-case letter. The pupil selects and clicks the upper-case letters below the lower-case letter alongside a clue picture.
- Lastly, the seventh part displays a treasure hunt activity on objects which start with vowels. A word at the lower-left corner of the slide indicates the name of an object to be hunted by the pupil. If the object is selected, the object moves to the basket.

Alphabet Knowledge Checklist on Vowels. To determine the level of alphabet knowledge during the pre-test and post-test, an alphabet knowledge score sheet was utilized. Table 1 below displays the interval of scores, and their description to determine the level of alphabet knowledge. A score of 1 was given to the correct answer on each item while a score of 0 was given to the wrong answer.

Table. 1. Level of Alphabet Knowledge

Score	**Descriptive Rating**	**Percentage**
26-30	Excellent	87-100
21-25	Good	67-86
16-20	Fair	47-66
11-15	Poor	27-46
Below 10	Very Poor	Below 27

Data Gathering Procedure

The first step in the process was the conduct of a pre-test. In this stage, the researcher administered the alphabet knowledge checklist on vowels. After the conduct of the pre-test, the presentation of a lesson on vowels was conducted using contextualized digital game-based learning resource. During the presentation of a lesson on vowels, it was utilized during Work Period 1 (a specific block of time in the Kindergarten Curriculum), a duration of 20 minutes a day for a 2-month duration. It was conducted at the school's ICT room with the aid of the Department of Education Computerization Package (DCP). After the two-month-long implementation, a post-test on alphabet knowledge was administered.

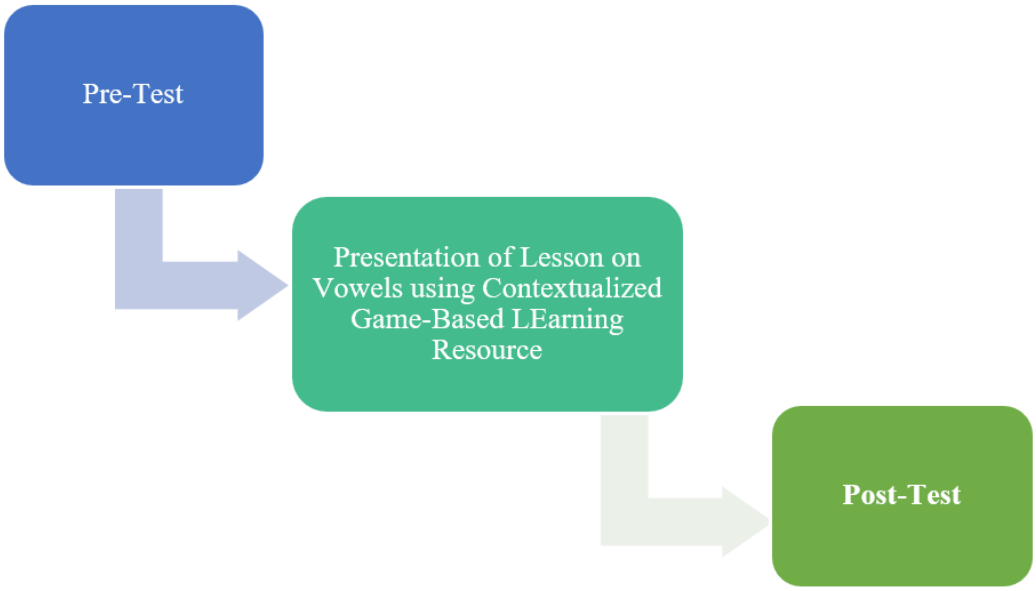

Figure 1. Data Gathering Procedure

Data Analysis

The data were analyzed using the following statistics:

Mean. The mean was used to compute the average of the pre-test and post-test scores. It shows the center of gravity of the scores desired.

Percentage Frequency Distribution. In this study, data were displayed incorporating the percentage frequency distribution. It specifies the percentage of observations that exist for each data point. It is specifically useful in expressing the relative frequency of survey responses and other data. Many times, percentage frequency distributions are displayed as tables as bar graphs or pie charts.

Paired T-test (Dependent Sample T-test). Paired T-test compares two means obtained from the same group. The effect of the contextualized digital game-based learning resource as the intervention was based on the result of the pretest compared to the result of the posttest. The data collected was analyzed inferentially, using

correlation statistics to analyze the hypothesis. The said hypothesis was tested at a 0.05 level of significance.

Results and Discussion

As shown in table 2, the overall pre-test mean score is 17.91 with a description of fair alphabet knowledge. In detail, 13.64% of the respondents have a good level of alphabet knowledge during the pre-test. 68.18% got a fair level of alphabet knowledge and 18.18% have a poor level of alphabet knowledge. The result indicated that 86.36% of pre-test scores belong to fair and poor range levels. This poor result is backed up by a variety of factors such as domestic-related (parent's attitude toward schooling, family problems); individual-related (poor academic performance, lack of interest/distractions, hunger/malnutrition); geographical (distance between home and school); and financial-related factors.

Table 2. Distribution of Respondents' Level of Alphabet Knowledge (Pre-Test)

Score	**Description**	**Frequency**	**Percent**	
26-30	Excellent	0	0.00	
21-25	Good	3	13.64	
16-20	Fair	15	68.18	
11-15	Poor	4	18.18	
Below 10	Very Poor	0	0.00	
Total		22	100.00	
Mean Score				17.91

After the implementation of digital game-based learning, the overall post-test mean score is 26.86 with a description of excellent alphabet knowledge. Table 3 below expounds that 59.09% of the respondents attained an excellent level of alphabet knowledge during the post-test. 36.36% achieved a good level of alphabet knowledge and only 4.55% have a fair level of alphabet knowledge. The mean difference between the scores in pretest and post-test scores on the alphabet knowledge checklist was used to measure the alphabet knowledge gained by the respondents with the support of digital game-based learning.

Table 3. Distribution of Respondents' Level of Alphabet Knowledge (Post-Test)

Score	**Description**	**Frequency**	**Percent**	
26-30	Excellent	13	59.09	
21-25	Good	8	36.36	
16-20	Fair	1	4.55	
11-15	Poor	0	0.00	
Below 10	Very Poor	0	0.00	
Total		22	100.00	
Mean				26.86

Figure 2 below shows the graphical presentation of mean scores obtained from the pre-test and post-test. It

indicated that there is a significant increase in the gain scores obtained which is equivalent to 8.95 points from the 26.86 and 17.91 mean scores of the post-test and pretest, respectively.

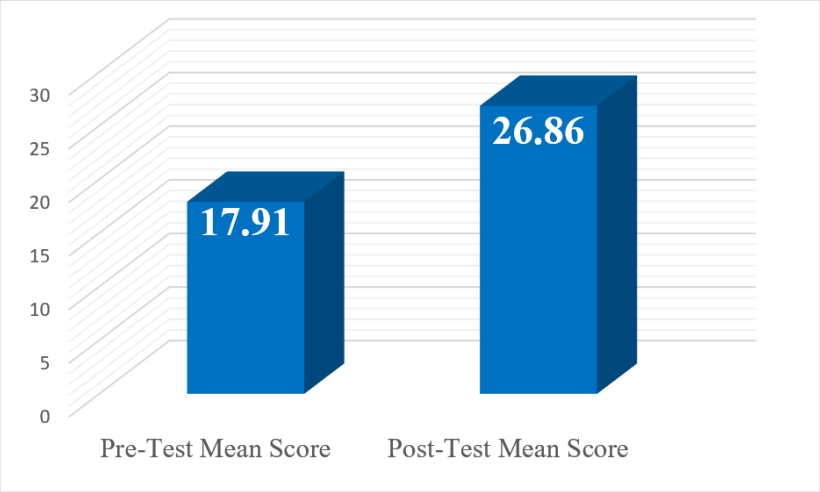

Figure 2. Mean Scores Obtained (Pre-Test and Post-Test)

Table 4 below summarizes the pretest and posttest mean scores using the t-test. It reveals the computation result of the mean, gain score, t-value, and p-value of the alphabet knowledge level of respondents for pre-test and post-test. The t-test for paired samples results in a t-value of -10.11 and a p-value of 0.000. The computed p-value is greater than the level of significance set in the study ($p > 0.05$), thus, the difference between the posttest and pretest is significant.

Table 4. Alphabet Knowledge Level of Respondents (Pre-Test and Post-Test)

	Mean	**Gain Score**	**t-value**	**p-value**	**Remarks**
Pre-Test Scores	17.91	8.95	-10.11	0.000*	Significant
Post-Test Scores	26.86				

The significant result between the pre-test and post-test scores as shown above is buoyed by the studies of Bragg (2012); Lotherington & Ronda (2009) and Siew (2018). It highlighted the crucial role of integrating teachers' pedagogical activities into digital game-based learning. In addition, it can efficiently progress students learning experience and improve their learning outcomes. In the concept of digital game-based learning, students love to play, experiment, and learn (Asad et al., 2016; Yüksel & Tuncel, 2017; Pareto et al., 2012; Beserra et al., 2014). Also, teachers' pedagogical activities can stimulate students to become attentive to the targeted subject. Studies have also shown that teachers' pedagogical activities can inspire students to become active learners, solve problems, and develop knowledge and skills (Lotherington & Ronda, 2009; Siew, 2018; Warren et al., 2009; O'Rourke et al., 2017; Barab et al., 2010; Beserra et al., 2014). Digital game-based learning has been displayed to increase students' knowledge achievement, enthusiasm, and engagement in primary education (Baytak & Land, 2011; Beserra et al., 2014; Fokides & Chachlaki, 2019; Yeh & Lan, 2018; Yüksel & Tuncel, 2017). Indeed, the contextualized digital game-based learning utilized in this study was an effective non-print instructional material in kindergarten for improvement of alphabet knowledge on vowels.

Conclusion

Traditionally, teaching methods used in early childhood education settings depend on resources such as storybooks and toys (Parette & Blum, 2013). But, in this digital generation of wired learners, traditional games and books are still relevant and should be sensible with activities using technology. Technology does transform how children play and can support their learning experiences (Dietze & Kashin, 2013). With the significant result of contextualized digital game-based learning in this study, the contemporary practices of phonics teaching need research-based evidence regarding the efficacy of the inclusion of digital play pedagogies.

Integrating digital game-based learning, especially in primary education creates a more inclusive definition of literacy according to Berschorner and Hutchinson (2013). Bers (2018) supported digital game-based learning in facilitating and adding a rich learning experience. Digital technology plays a crucial role in understanding the digital world and in providing a richer learning environment for young learners (Berson & Berson, 2010). Teachers should ponder that young learners make meaning and construct knowledge through play. They do not solely rely on and receive information. Phonics language learning is a complex issue encompassing a multitude of factors including contextualization, it is critical to be conscious of how to build a strong foundation of alphabet knowledge skills and to understand how this skill enables learners to progress in early language reading.

Recommendations

In the light of the findings and implications made by the study, the following recommendations were offered:

1. Use contextualized digital game-based learning approach in other letters of the alphabet specifically consonants to further validate the result of the study.
2. Conduct further studies on digital game-based learning using respondents in other grade levels to confirm its effectiveness in improving alphabet knowledge.
3. Encourage administrators and kindergarten teachers to make contextualized digital game-based learning resources in all topics found in the Kindergarten Curriculum guide not only the least mastered skills.
4. Kindergarten teachers shall be provided with more seminars and workshops on creating a contextualized digital game-based learning resource.

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