SYSTEMATIC REVIEW AND META-ANALYSIS OF DIGITAL GAME-BASED LEARNING FOR ENGLISH PROFICIENCY: IN SEARCH OF A POLICY BRIEF ON CURRICULAR DESIGN FOR THE NEW NORMAL

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ABSTRACT

With the proliferation of electronic gadgets, digital games unfailingly proved their strength in the academic circle, specifically in learning English concepts. Despite these facts, a statistical-based comprehensive conclusion must be drawn regarding the effect of digital game-based learning on English proficiency. This study was conducted through a systematic review and meta-analysis of published thesis and dissertations collected from various distinguished research databases. The purpose of this meta-analysis is to characterize and compare outcomes related to the effectiveness of digital game-based learning towards the English proficiency of primary students as they are presented in the educational literature. Through a meta-analysis, the heterogeneity between the studies was minimized, and the data were analyzed according to the effect size. The examined studies suggest that digital game-based learning differs in a statistically significant way when compared to traditional instruction. Finally, to promote the most comprehensive application of digital games into education and teaching, there was a need to include this method in crafting policies that were deemed relevant in today's setting.

Keywords: Education, educational leadership, digital game-based learning, English proficiency, systematic review and meta-analysis, Philippines

INTRODUCTION

Digital game-based learning (DGBL) has gained its pre-eminence at the onset of the mobile era. With this, numerous studies about DGBL have been conducted over the past decades. In fact, over 28,034,824 articles are found in the world's largest open research aggregator – the CORE database, Bielefeld Academic Search Engine (BASE) has 9,418 hits, Directory of Open Access Journals (DOAJ) has 215 articles, about 67,900 on Semantic Scholar, and ProQuest shows 36,055 results of published dissertations and theses around the world regarding this content. These figures are constantly increasing with the number of published journals (Fazil & Said, 2020; Chang & Hwang, 2019; Gamlo & Abdul-Aziz, 2019; Alamr, 2019; Serrano, 2019; Acquah & Katz, 2019; CasañPitarch, 2018) and on digital game-based learning which is perpetuating and accumulating the research databases in time. Most studies from the published researches are in experimental design and are commonly applied to students in varying educational levels. Predominantly, these studies have dependent variables measuring academic performance or targeting skill development and independent variables comparing DGBL and traditional teaching methods' effectiveness. The recently conducted Standard English administered by English Proficiency Education First has reported that the Philippines took a sharp decline as it scored 60.14 out of 100 in the 2019 English Proficiency Index (Valderama, 2019). Educators embark on various pedagogical approaches to increase student achievement in the English discipline

to counterfeit this problem. However, it is important to understand how different the generations of learners are today from the past decades. Today's digital natives 'virtually spend 80-90% of their time using one technology or the other' (Idris et al., 2015). They have grown up with the Internet, smartphones, text messaging, and various social media platforms that penetrate their daily activities (Bhatt & Christe, 2016); hence, they "think and process information fundamentally different from their predecessors" (Prensky, 2001). Outdated teaching methods have not attracted their attention (Cheng & Su, 2011). It is not possible to acquire the skill sets needed to produce holistic learners that can compete in today's work environment. Prensky (2001); Gros (2007); Gillispie et al. (2008) as cited in Little (2015), expounded that for teachers to be successful in meeting the educational needs of modern students, education must compete with students' attention and remodeled with a variety of media-rich and interactive experiences. Hence, educators should consider an updated pedagogical approach to meet the educational needs of modern students successfully.

Digital game-based learning and serious games, according to Miller et al. (2011) and Little (2015), are games that focus primarily on education rather than entertainment. Digital games offer a combination of academic content and learning activities into an entertainment context that maintains the balance between fun and learning (Featherstone et al., 2013). Furthermore, it has abundant characteristics such as representation, fun, play, goals, outcomes and feedback, win states, 3 competition/challenge, problem-solving, task, story, and so on (Felix & Johnson, 1993; Prensky, 2003 as cited in Cheng & Su, 2011). On the other hand, conventional teaching was defined in this research as traditional teacher-centered methods that are lecture-oriented, textbook-centered, exam-oriented, and others. In this research, the term was used interchangeably as regular teaching, traditional teaching, quizzes-oriented teaching or presentation, and lecture-oriented method.There are a lot of research studies that strongly concord that digital gamebased learning has the potential to enhance the teaching-learning process. Research in South Asia, specifically in Pakistan and Bangladesh, published a qualitative analysis that non-formal digital game-based learning intervention has positively changed learning outcomes. The students showed development in their basic literacy and numeracy skills and progressed through the games they played (Pynnönen, 2019). Several authorities like Rutschow and Schneider (2011); and Bailey (2008) as cited in Wilson (2013), recommended the use of "technology in accelerated and modularized courses" for math remedial education reform. Research conducted in the United States by Little (2015) demonstrated that using digital games as supplemental instruction during lab activity to reinforce science concepts in a biology class increases student academic achievement. Alongside that, a study in Italy confirms that the new digital game-based learning approach ---Learning on Games (LoG) improves both integrated development of basic skills and European key competencies like entrepreneurship, cultural awareness, and social responsibility (Maraffi et al., 2017). Furthermore, an experimental study was done by Hung et al. (2014) in Beijing, China showed that the game-based e-book 4 learning model effectively promoted the students' learning achievement, selfefficacy, and mathematics motivation. Conversely, the studies of Bourgonjon et al. (2011) as cited in Piller (2016), pointed out that although teachers are more consenting to incorporate games and nontraditional methodologies to teaching, schools have been lethargic in adopting digital-game based learning as a component of the curriculum. Their analysis has shown that the teachers' and parents' disposition affects the chance of acquiring digital games into classrooms and even affects their efficiency during instruction. Another major reason teachers disagreed with incorporating digital games in their class is the negative judgment of the student's parents succeeded by the misconception of the public and reputation

of the games as a deviant and corrupt medium (Williams, 2009). As schools continuously forge a stronger link to parents and stakeholders (DepEd Order No. 23 s. 2016; DepEd order No. 54 s. 2009; DepEd Order No.36 s. 2008), the assumed parental concerns over digital games largely affect public policy-making (Kutner et al., 2008). Considering the fact that the reputation of digital game-based learning is highly debated in the academic context, especially in the Philippine setting (Conte, 2017; Ramirez et al., 2010; Jorda & Santos, 2015; Caparoso et al., 2014), only a few methodological reviews (All et al., 2014), systematic reviews (Ke, 2015; Wilson, 2013) and few meta-analyses have been done in the international education research database; hence, there is a need to carry out a systematic review and meta-analysis relating to this content. 5 Systematic reviews represent the strongest forms of evidence. It is constructed by taking data from individual studies, evaluating articles systematically, combining them into one review, and making conclusions (Patwari, 2014). Many of the previous studies on systematic review and meta-analysis focus on game design (Clark, 2016); science learning (Tsai & Tsai, 2020), mathematics learning achievement (Serrano, 2019); effects of games and simulations on higher education (Vlachopoulos & Makri, 2017); however, few meta-analysis studies focus on grade school learner's English proficiency. The researcher has reviewed data and explored evidence, evaluated the legitimacy of the studies, synthesized evidence regarding game-based learning in instruction, conducted a metaanalysis, and assessed the potency of DGBL in student learning. University professors Male and Palaiologou (2017) asserted that the more holistic approach to educational leadership is based on pedagogical knowledge and understanding. They expounded that in education contexts ---knowledge is the most crucial element. Hence, since student learning and development are essential components for a school principal's leadership, the researcher anticipates that the entire research process can be useful in the creation of instructional policies and evidence-based implementation plan to incorporate digital game-based learning in the English curriculum design for the "new normal" instruction and the future instructional approach. Through this, the role of an educational leader who at the same time functions as a pedagogical leader directly impacts teaching and learning by establishing organizational norms of continuous quality improvement through this innovation. Furthermore, conducting a 6 systematic review and meta-analysis in digital game-based learning is a precondition for tailored English instruction. The researcher would share the findings of the study in various forums and platforms. It will be disseminated in school and district learning action cell (LAC) sessions and during the enhanced school improvement planning (SIP) as a solution to priority improvement areas under one of the key result areas in basic education. It will also be presented through national or international research congresses. For a broader scope of dissemination, this research study will be subject to online refereed journal publication.

FRAMEWORK

This study is anchored on Theory Synthesis by Turner (1990), whose insistence focused more on abstract, epistemological critiques than on developing coherent and valuable explanations of social forces. He further argues that synthesizing is the key to developing robust theories with practical relevance. Synthesizing theory involves collation, evaluation, and the process of combining theories for practical use. Hellman (2003) elaborated that synthesis is putting parts together to form a whole. This has three stages: (a) synthesis preparation that includes summarizing and extracting parts of relevant theories; (b) synthesis that requires comparing theories for points of convergence and divergence to bring together those points that converge and (c) synthesis refinement, which involves synthesis interrogation to come up for theoretical

insights. This process has the potential to reinvigorate theory and make it more robust and accessible for practical application.

METHOD

Research Design

The study used systematic review and meta-analysis to ascertain whether using digital game-based learning as a teaching strategy would significantly improve students' academic achievement. Systematic reviews represent the strongest forms of evidence. The way it is constructed is by taking data on individual studies, evaluating articles systematically, combining them into one review, and making conclusions. Confucius, Lao-Tze, and Donald Rumsfeld had pointed out, being able to tell the difference between real and assumed knowledge is important and systematic reviews help us tell which is which (Petticrew & Roberts, 2006). Systematic reviews are done to increase the precision of the conclusions out of the complex issues being studied (Patwari, 2014). On the other hand, meta-analysis is a statistical pooling of results from the included studies identified during the systematic review (Patwari, 2014). In this method, the first step is to locate studies of an issue by clearly specified procedures. Then, characterize the outcomes and features of the studies in quantitative or experimental research. Finally, a meta-analysis uses multivariate techniques to relate the characteristics of the studies to results. This approach is the most appropriate method for this study because of the primary objective: to ascertain the significance of the relationship between digital game-based learning and English proficiency achievement out of the many available pieces of research from online databases.As a whole, this study focused on the significant difference in academic achievement in English between the students exposed to digital game-based learning and the traditional teaching method.

Data Sources and Selection

This study's broader purpose was to understand the current state-of-the-art studies on digital game-based learning in the domain of English at the elementary education level. The electronic databases that were used for this study are ProQuest Educational Research Journal, Springer Link, Education Resources Information Center (ERIC), International Journal of Interactive Mobile Technologies (iJIM), Journal of Educational Technology and Society (JSTOR), Arab World English Journal (AWEJ), British Journal of Educational Technology, Westminister Papers in Communication and Culture, Taylor and Francis Online Journals, International Journal of Emerging Technologies in Learning (iJET), Semantic Scholar, Turkish Online Journals of Educational Technology (TOJET), Public Library of Science (PLOS), Connecting Repositories (CORE), ETHOS, Google Scholar, Research Gate, and ELSEVIER. This review covered research articles from 2002 to 2020. These online repositories were chosen because they are known to include high-quality and high-impact studies. Further, the following search terms and keywords were used ("digital game-based learning and English proficiency journals," "DGBL in elementary students in English," "quasiexperimental DGBL studies in elementary English" and "digital games in learning English journals"). The titles, abstracts, and methods section were thoroughly reviewed to filter out unrelated studies. The researcher independently retrieved and reviewed all included studies to ascertain that the studies met the inclusion criteria. Subsequently, all the necessary data gathered from the included studies were charted out in

the participants-intervention-comparator-outcome (PICO) table. According toEriksen and Frandsen (2018), the purpose of using PICO is considered to be threefold ---firstly, it forces the questioner to focus on what the believes to be the single most crucial issue and outcome. Second, it facilitates the computerized search by prompting the questioner to select language or key terms to be used in the search. Thirdly, it directs the questioner to identify the problem, intervention, comparator, and outcomes.

Inclusion and Exclusion Criteria

In a meta-analysis, the so-called 'apples and oranges problem' forge the question of what made a particular study similar enough to be included and what made them different enough to be excluded (Norris & Ortega, 2006; as cited in Kao, 2014). Setting a well-defined inclusion and exclusion criteria ascertains that the research question is focused and prevents bias in selecting studies before performing the literature search. The goal is to locate related research articles that reported empirical findings on the relative effectiveness of the digital game-based learning approach on primary students in the English discipline compared to the traditional methods of teaching or other technology, game-enhanced learning approaches. Distinctively, the following conditions were considered to assure aptness in the selection of papers. All journal articles included in the review had discussed digital video games and educational games of its type; showed the significant difference of result; made use of quasi-experimental design which compared the effects of those students exposed in DGBL (experimental group) and those who receive traditional instructions (control group); reported as quantitative studies that provide statistical data for effect size calculation such as means, standard deviations, p-value; assessed students' learning effects through pre and posttests evaluation for the analysis on the effects of DGBL on students' English learning performance; possessed internal validity; showed appropriateness of data analysis and
presentation; published internationally; included participants from early primary education; and focused solely on English-related competencies. Conversely, the exclusion criteria were also set. Many of the research studies were excluded due to the following, namely, targeting irrelevant research problems, such as behavioral, psychological or those that only investigate students' motivation or attitude toward DGBL; applying DGBL in non-English discipline; the non-digital game-based system was used like massively multiplayer online role-playing game (MMORPG), computer-assisted language learning (CALL), mobile-assisted language learning (MALL); non-quasi-experimental in 32 terms of research design; showing incomplete test results; no control and experimental group; non-quantitative research design; and researches conducted to grade levels not in range in early primary years.

Data Extraction

Data extraction is the act of retrieving data out of unstructured or poorly structured data sources for further data processing or data storage (The Audiopedia, 2018). It is also essential to consider the research questions, eligibility criteria, and study characteristics in extracting the data (Virginia Tech, 2020). In the present review, all nine studies that fit the inclusion criteria were systematically analyzed and refined. A coding sheet was used to organize the statistical

details of each selected study viz; title, authors, date of publication, country where the research was conducted, total sample size (n), mean post-test of control and experimental group, standard deviation, and p-value.

Statistical Tools

In the meta-analysis phase of this study, the groups' means and SDs, effect sizes such as SMDs, Q-test, I-square test, tau-squared, forest plot analysis, and funnel plot analysis were used to synthesize the quantitative findings from the various qualified research studies.

RESULTS AND DISCUSSION

Study Selection

Studies were considered not relevant for this review if they did not meet the inclusion criteria of the search. Thus, to establish study exclusion within the metaanalysis sample, the author applied these eight exclusion criteria. 40 The author obtained 315 articles that were initially considered for inclusion in the study. After the rigorous screening of the titles and abstracts, 57 were eliminated since studies employed non-digital games. Further review of these 258 articles resulted in the exclusion of 72 studies since they focus on objectives irrelevant to English proficiency (learners' motivation, parent-child communication, gender study, sign language, player emotions). From 186 studies subject to another review, 20 were rejected considering the experimental process was applied to non-English learning areas. From the 166 studies left, 51 were further excluded since these studies did not meet the age/grade level criteria being set. From the115 studies remained; however, studies should be quantitative thus, 92 were removed. From the 23 studies left, 6 studies were dropped since these researches did not apply the quasi-experimental method. An addition of 1 study was removed due to single grouping quasi-experimental techniques and 7 researches were also discarded due to incomplete/unavailable findings. Therefore, a total of 9 studies that met the inclusion criteria were subject to a systematic review.

Features of the Included Studies

The nine included studies in this meta-analysis are presented in Table 1. The data were gathered from different electronic research journal databases and published, generated, and retrieved by other authors worldwide. All studies reflected sample sizes of not less than 30, for instance, the total sample of experimental and control groups; the smallest sample size being 30, and the highest being 100. The studies gathered have p–values ranging from 0.000 to 0.042. These studies were gathered from research journal databases from various websites of colleges and universities, which covered three different continents, namely, North America, Asia, and Europe.

Study Regions

North America. One study was identified to have been recently conducted in the U.S, specifically in mid-Atlantic University. The United States of America has been a world leader in leveraging innovation. It has consistently invested heavily in research and development, higher education, innovators, and information and communication technology (Innovative Asia

Advancing the Knowledge-Based Economy: Highlights of the Forthcoming ADB Study Report, 2014).

Table 1
Features of the Included Studies

No	TITLE	Author/s Year Published Country	URL (Uniform Resource Locator)	Design	Participants and Sample Size (n)	MEAN	SD	SMD	p-value
1	The Effect of Using an Electronic Instructional Game in Improving English Language Vocabulary for Third Graders in Irbid City	Alsharafat, W.; Alrashdan, Wesam Kudri; and Younes, Mohammad Bani (2017) Jordan	iJIM https://doi.org/10.3991/ijim.v11i6.7417	Quasi-Experimental	Experimental – 52	25.98	4.114	1.015	<= 0.05
					Control - 47	21.91	3.895		
2	The Effects of Digital Game-based Learning on Primary School Students' English Vocabulary Achievement and Acceptance	Rabu, Siti Nazleen Abdul and Talib, Zuliana (2017) Malaysia	Google Scholar https://www.researchgate.net/publication/321268645_The_Effects_of_Digital_Game-based_Learning_on_Primary_School_Students'_English_Vocabular	Quasi-Experimental	Experimental – 35	76.83	19.62	3.255	0.000
					Control - 35	24.57	11.43		
3	The Effect of Educational Computerized Games on Learning English Spelling among Iranian Children	Mehrpour, Saeed; and Ghayour, Maaedeh (2017) Iran	CORE http://www.readingmatrix.com/files/17-e86qd11r.pdf	Quasi-Experimental	Experimental – 33	18.80	1.09	1.475	0.001
					Control - 33	16.22	2.22		
4	Application-driven Educational Game to Assist Young Children in Learning English Vocabulary	Chen, Zhi-Hong and Lee, Shu-Yu (2018) Taiwan	JSTOR 10.11139/cj.28.3.639-661	Quasi-Experimental	Experimental – 15	95.67	7.71	0.334	p < .01
					Control - 15	93.33	6.23		

5	Education in the app store: using a mobile game to support U.S. preschoolers' vocabulary learning	Dore, Rebecca A.; Shirilla, Marcia; Hopkins, Emily; Collins, Molly; Scott, Molly; Schatz,	Routledge Taylor and Francis Journals https://doi.org/10.1080/17482798.2019.1650788	Quasi-Experimental	Experimental – 34	.54	.22		

		Jacob; Lawson-Adams, Jessica; Valladares, Tara; Foster, Lindsey; Puttre, Hannah; Spiewak Toub, Tamara; Hadley, Elizabeth; Golinkoff, Roberta M.; Dickinson, David; Hirsh-Pasek, Kathy (2020) USA			Control - 23	.25	.16	1.463	0.001
6	Video Games Promote Saudi Kids English Vocabulary Retention	AlShaiji, Ohoud Abdullatif (2017) Kingdom of Saudi Arabia	Research Gate https://apiar.org.au/wp-content/uploads/2017/02/28_APJCECT_Feb_BRR737_EDU-315-324.pdf	Quasi-Experimental	Experimental – 30	22.19	3.72	1.085	0.000
					Control - 30	18.083	3.85		
7	"The effect of digital games on Iranian vocabulary retention in foreign language acquisition."	Aghlara, Laleh and Tamjid, Nasrin Hadidi (2011) Iran	ELSEVIER 10.1016/j.sbspro.2011.11.275	Quasi-Experimental	Experimental – 20	7.8	1.54	0.666	0.042
					Control - 20	6.6	2.03		
8	Use of Digital Games in Teaching Vocabulary to Young Learners	Hazar, Esin (2020) Turkey	Google Scholar 10.24193/ed21.2020.19.12	Quasi-Experimental	Experimental – 20	17.1000	7.71124	0.704	0.040
					Control - 17	11.5294	8.14799		
9	The Impact of Using Electronic Games on Teaching English Vocabulary for Kindergarten Students	AlNatour, Amal Shehadeh; and Hijazi, Dima (2018) Jordan	Research Gate https://www.davidpublisher.org/Public/uploads/Contribute/5b14f446b7b16.pdf	Quasi-Experimental	Experimental – 55	82.09	8.559	0.538	0.001
					Control - 45	77.05	10.286		

A national survey by the Common-Sense Media cited by Flynn, Richert, and Wartella, posited those American children under age eight live in a home with a tablet or smartphone. Also, children between five and eight years of age play digital games for about forty-two minutes each day, twenty-four of these minutes on mobile devices. Children's playing of digital games on mobile devices has increased at the age of six since earlier surveys were conducted in 2011 and 2013 (Flynn et al., 2019).

Asia. There were studies conducted in Asia, specifically in Iran, Jordan, Malaysia, Taiwan, and Saudi Arabia. Just like the USA, Southeast Asians have shown prevalent use of mobile games. Niko Partners projects the number of PC online and mobile gamers in Southeast Asia alone to reach 4.76 million by 2023, generating an expected revenue of 8.3 billion US dollars. This makes the world's fastest-growing region for online game revenue. As Singtel (2020) presented, the rapid growth of mobile and internet users in Southeast Asia has led to a corresponding surge in interest in e-sports. It has been highlighted from the works of (Hallinger 1998) that a critical change force in the globalization era has been the expansion of communication, information and transportation networks. Combined with a more active and open global media, these have resulted in much greater access to information to Southeast Asia countries.
Western Asia's Internet and mobile markets, on the other hand, are the most competitive. The market structure and regulatory landscape of ICT infrastructure in the ESCWA region are slowly developing towards maturity, albeit steadily, with more sophisticated regulatory frameworks. Jordan and Saudi Arabia have made considerable progress in adapting ICT-related laws and regulations and have had success with initiatives for ICT standardization (Regional Profile of the Information Society in Western Asia, 2009).

Europe. Another study has been conducted in Europe, specifically in Turkey. In recent years the European Union has aggressively invested in research on innovative approaches to education, including game-based learning and gamification (Thomas, 2018). According to Ravipati (2017), a new research study will collect learning data on educational gaming experiences in the classrooms to validate game-based learning across Europe. This study will involve educators in Greece, Italy, Norway, Poland, and Portugal.

Authorship Collaboration

Two persons wrote five studies, three persons authored one study, two were penned by one person, and fifteen persons authored one study. There is no limitation to the number of co-authors on a paper. In the simplest of terms, the number of authors to which an academic or scientific paper should be attributed is the number of researchers who acted as scholarly authors to create it (Tetzner, 2018). The International Committee of Medical Journal Editors (2021) emphasized that authorship can only be granted to those who have substantial contributions to the conception or design of the work; acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Databases and their Uniform Resource Locator (URL)

A Uniform Resource Locator (URL), colloquially termed a web address, refers to a web resource that specifies its location on a computer network and a mechanism for retrieving it. In this meta-analysis, the eighteen research databases of the included studies are ProQuest Educational Research Journal, Springer Link, Education Resources Information Center (ERIC), International Journal of Interactive Mobile Technologies (iJIM), Journal of Educational Technology and Society (JSTOR), Arab World English Journal (AWEJ), British Journal of Educational Technology, Westminister Papers in Communication and Culture, Taylor and Francis Online Journals, International Journal of Emerging Technologies in Learning (iJET), Semantic Scholar, Turkish Online Journals of Educational Technology (TOJET), Public Library of Science (PLOS), Connecting Repositories (CORE), ETHOS, Google Scholar, Research Gate, and ELSEVIER. These research journal databases are increasingly acknowledged as academic, social network sites for scholarly communication. Thus, only verified
researches could be included.

Design

All studies included are in a quasi-experimental research design. This research design is an empirical interventional study used to estimate the causal impact of an intervention on a group of students. The intervention comprises the elements and is tested on how well it achieves its objectives, as measured by a pre-specified set of indicators (White and Sabarwal, 2014). In a quasi- experiment, the control and treatment groups differ in the experimental treatment they receive and other unknown ways. Thus, the researcher statistically controls as many of these differences as possible.

Quasi Experimental Design. Studies 1 to 9 utilized a quasi-experimental research design. These studies used a quasi-experimental design that involves two groups; one group receives the digital game-based learning (DGBL) method while another group receives the conventional instruction method. The rationale behind this research design is to identify the effectiveness of the two learning methods in influencing elementary students' proficiency in learning English concepts. In this research plan, a pre-test and a post-test were administered to obtain the data needed. In most of the quasi-experimental designs, the pre-test was identical to the posttest to compare the data before and after the intervention. The pre-test and post-test were used to test the performance of the two groups.

Participants and Sample Size (n)

The size of a sample influences the precision of research estimates and the power of the study to conclude (Sample Size and Power, 2008). Thus, determining the right sample size is crucial for a robust experimental design. The authors of the chosen primary studies described the sampling process of the participants to be included in their research. The least sample size included in the study is 30 participants, where 15 participants were equally distributed in both experimental and control groups (Study 4). This sample size is adequate since 15 students are considered acceptable when implementing classroom research (Dörnyei, 2007as cited in Idris, et al., 2020).

The largest number of participants in the included studies is 100 (Study 9), comprising 45 students in the experimental group and 55 in the control group. The larger the sample size, the more precise the mean (Zamboni, 2018). A larger sample size allows the researcher to increase the significance level of the findings since the confidence of the result is likely to increase with a higher sample size.

Standardized Mean Difference (SMD)

The APA Publication Manual recommends that it often be valuable to report the mean difference and the standardized mean difference (Takeshima et al., 2014). In his book "Introduction to Meta-analysis," Borenstein further explained that if the unit is unfamiliar, the standardized mean difference serves as an easy way to judge the magnitude of the effect. Cohen interpreted that an SMD of 0.2 represents a "small" effect, an SMD of 0.5 represents a "medium" effect, and an SMD of 0.8 represents a "large" effect (McLeod, 2019). The values of the SMD were generated from the comprehensive meta-analysis software version 3 (Borenstein, 2018).

Probability Value

The p-value was used as an alternative to rejection points to provide the smallest significance level at which the null hypothesis would be rejected. A smaller p-value means stronger evidence in favor of the alternative hypothesis (Beers and Westfall, 2020). In Table 1, the p values used in the included studies are $p=0.040$ and $p=0.042$ for study 8 and study 7 respectively; $p < .01$ for study 4; $p< 0.05$ for study 1; $p=0.0001$ for study 5; $p=0.001$ for study 9 and the rest of the studies has a value of $p=0.000$.

Participants, Intervention, Comparator, and Outcome (PICO)

Table 2 presents the four components for the PICO analysis of the nine included studies. PICO represents an acronym for Participant, Intervention, Comparator, and Outcome. These four components are the essential elements of the research question.

Participants

The "P" in PICO represents the participant. This part of the PICO table has explained the characteristics of the participants of the included studies (Huang et al., 2006). Since this study talks about the effectiveness of Digital Game-Based Learning versus the conventional method in teaching English, most of the target participants in the included studies were early primary students.

Early Primary Students. The first year of primary education, or referred to as kindergarten, begins in American, European, and Asian countries at an early age of 5 and continues until age 11. Succeeding years are usually numbered, being referred to as first grade, second grade, and so forth. During this period, the language skills of children continue to grow. Their attention's focus is learning fundamentals.

Table 2
Participant, Intervention, Comparator, and Outcome (PICO) Profile of the Included Studies

Title	Participant	Intervention	Comparator	Outcome
1. The Effect of Using an Electronic Instructional Game in Improving English Language Vocabulary for Third Graders in Irbid City	Third Grade Experimental – 52 Control – 47	Programmed Computer Game	Regular Teaching Method	Group / EG / CG Mean (Post Test) / 26.795 / 21.002 MD / 5.793 There are significant differences at ($p<0.05$) between the group's average performance studied through educational games compared to the group using regular teaching methods.
2. The Effects of Digital Game-based Learning on Primary School Students' English Vocabulary Achievement and Acceptance	Fourth Grade Experimental – 35 Control - 35	Speed Word Game Digital Game-Based Learning (DGBL) method	Interactive Multimedia Learning (IML) method	Group / EG / CG Mean (Post Test) / 76.83 / 24.57 MD / 52.26 The null hypothesis was rejected due to significant difference, which proves that students who experienced DGBL the method shows better English vocabulary mastery compared to students from the IML group.

3. The Effect of Educational Computerized Games on Learning English Spelling among Iranian Children	Fourth Grade Experimental - 33; Control - 33	Educational Computerized Game called "Fun Spelling"	Conventional Instruction	<table><tr><td>Group</td><td>EG</td><td>CG</td></tr><tr><td>Mean (Post Test)</td><td>18.80</td><td>16.22</td></tr><tr><td>MD</td><td colspan="2">2.58</td></tr></table> The results of the t-test showed that the experimental group had significantly outperformed the control group.
4. Application-driven Educational Game to Assist Young Children in Learning English Vocabulary	Fourth Grades Experimental - 15; Control - 15	Educational Game named My-Pet-Shop	Quiz Game	<table><tr><td>Group</td><td>EG</td><td>CG</td></tr><tr><td>Mean (Post Test)</td><td>95.67</td><td>93.33</td></tr><tr><td>MD</td><td colspan="2">2.34</td></tr></table> The results of the t-tests revealed that the post-test scores were significantly higher than those of the pre-test in both EG and CG. The result implies that both of the systems were beneficial for enhancing student performance.
5. Education in the app store: using a mobile game to support U.S. preschoolers' vocabulary learning	Pre-school Experimental – 34 Control – 23	Mobile Game	Traditional Method	<table><tr><td>Group</td><td>EG</td><td>CG</td></tr><tr><td>Mean (Post Test)</td><td>.54</td><td>.25</td></tr><tr><td>MD</td><td colspan="2">.27</td></tr></table> Children who played the game answered a significantly higher proportion of test questions correctly (M ▪ .54, SD ▪ .22) than control group children who did not play the game.
6. Video Games Promote Saudi Kids English Vocabulary Retention	Pre-school 5-6 yrs. old Experimental - 30; Control - 30	Video Games software installed	Traditional Method	<table><tr><td>Group</td><td>EG</td><td>CG</td></tr><tr><td>Mean (Post Test)</td><td>22.19</td><td>18.083</td></tr><tr><td>MD</td><td colspan="2">4.107</td></tr></table> There was a statistically significant difference at (α▪0.05) between students' scores on the post-test attributed to the teaching method in favor of the experimental group members.

7. The effect of digital games on Iranian Vocabulary retention in foreign language acquisition	First Grade 6-7 yrs. old Experimental - 20; Control - 20	SHAIEx Digital Game	Traditional Method	Group / EG / CG Mean (Post Test) / 7.8 / 6.6 MD / 1.2 The results of the independent t-test analysis (Table 2) indicated that the two means are significantly different from each other t (38) =2.10, p=0.042.
8. Use of Digital Games in Teaching Vocabulary to Young Learners	Third Graders Experimental - 20; Control - 17	Digital Games on EBA (Education Informatics Network) platform	Pen and paper practices	Group / EG / CG Mean (Post Test) / 17.1000 / 11.5294 MD / 5.5706 The experimental group's post-test scores were significantly higher than those of the control group. This implies that the intervention had a significant positive effect on the vocabulary knowledge of 3rd grade EFL learners.
9. The Impact of Using Electronic Games on Teaching English Vocabulary for Kindergarten Students	Pre-school Experimental - 45; Control - 55	Online Games	Traditional Teaching	Group / EG / CG Mean (Post Test) / 82.09 / 77.05 MD / 5.04 The post-test of the experimental group and the control group presented a statistically significant difference at α = 0.05 in favor of the experimental group (M= 82.09).

Game-Based Learning is built on Jean Piaget's theory of constructivism that emphasizes the need to provide students with the necessary tools to develop their procedures to solve a problem (Brau, 2020). Computer games are effective learning tools when they can incorporate "social interactions and dialogue among learners and between learners and teachers" and "performance of students can consequently be improved" (Foko, 2008). This implies a participatory process by students, who interact with their environment to solve the situation that is being set out to them.

Game-based learning uses intrinsic experiences. It detaches from a simple extrinsic rewards-based system, and students play games in pursuit of a reward or achievement, disconnecting from the fundamental content.

Study 5. Participants were recruited by telephone and email from a database of families willing to participate in research at a mid-Atlantic university. Fifty-seven (57) four-year-old children (31 girls; 26 boys) participated with an average age of 56 months. Five additional participants were

Table 3
Preschool and First Grade Pupils in the Included Studies

Study 5 Dore et al	Study 6 AlShaiji	Study 7 Aghlara	Study 9 AlNatour and Hijazi
✓ Fifty-seven (57) four-year-old children were recruited through telephone and email from a database of families willing to participate in research at a mid-Atlantic university. ✓ Participants were predominately white, monolingual, and from middle SES backgrounds. ✓ Experimental Group – 34 students in the game group ✓ Control Group – 23 students ✓ Both groups did not differ in gender (p = .88), age (p = .22), mean level of primary caregiver's highest level of education (p = .64), or on the percentage of White children (p = .53).	✓ Sixty (60) female Saudi children from a Kindergarten school in Riyadh ✓ Randomly assigned ✓ Experimental Group – 30 students ✓ Control Group – 30 students ✓ A validated pre and post-test vocabulary were administered that suited the samples' ages.	✓ Forty (40) six to seven-year-old Iranian children with no prior knowledge of English participated in the experiment. ✓ The population was divided into two equal groups. ✓ Experimental Group– 20 participants taught using DGBL software called SHAIEx. ✓ Control Group– 20 participants taught using traditional methods. ✓ All participants underwent a 45-day teaching period. ✓ Both groups of children undertook the final vocabulary test after the entire process.	✓ 100 kindergarten students in private kindergartens in Irbid during the first semester 2016-2017 ✓ Assigned through purposive sampling ✓ Experimental Group – 45 students ✓ Control Group – 55 students ✓ A researcher-designed test based on the instructional material of the kindergarten English book was conducted to the participants before and after the experiment.

tested but excluded due to experimenter error (n = 1), refusal to cooperate (n = 1), scheduling error (n = 2), and having less than 70% English spoken at home as indicated by the parent report (n = 1). *A* receptive vocabulary test to examine whether children learned the game's words was administered.

Study 6. Participants in study number 6 are kindergarten pupils in Riyadh, Saudi Arabia. The researcher used a random sample of (60) female Saudi children from a kindergarten in Riyadh; (30) students to represent the experimental group ---the one taught using video games; and (30) students to represent the control group which was conducted using the traditional method of instruction. All the participants were evaluated through a validated vocabulary pre and post-test.

Study 7. Student participants in study number 7 are forty, six to sevenyear-old girls with no prior knowledge of English. They were divided into two equal groups of experiment and control, each consisting of 20 participants. All the participants underwent a forty-five-day teaching period, which consisted of three ninety-minute sessions during the week. Pupils in the experimental group were taught English vocabulary consisting of the names of different animals, family 56 members, colors, and numbers using digital games, while children in the control group were taught lessons using the traditional methods.

Study 9. The study sample consisted of 100 kindergarten students in private kindergartens in Irbid City during the first semester of the school year 2016- 2017. Participants were divided into four parties and were chosen purposefully; that means two experimental and two control groups. The students in both groups took a pre-test and post-test at the beginning and end of the experiment. The pre and post-test made by the researcher underwent validity and reliability checked. A period of eight weeks between the pre-and post-test was allotted for the entire experimental process.

Table 4
Third Grade Pupils in the Included Studies

Study 1 Alsharafat, et al	Study 8 Hazar
✓ 97 third grade ✓ students of Irbid City in the academic year 2016-2017 ✓ Participants are selected from Kofor Awaan Girls School and Abu Isam Primary Boys Schoolfor easy access to them ✓ Experimental Group – 52 male and female students, taught English language vocabulary through a computer game strategy ✓ Control Group – 47 male and female students conducted using regular teaching ✓ Participants are distributed randomly.	✓ This study recruited 37 third-grade students (18 male; 19 female) from two separate classes. ✓ Two third-grade classes were randomly selected to participate in this study. ✓ A class of 20 students was identified as the experimental group and another class of 17 for the control group. ✓ Children answered a validated pre, and post-test vocabulary prepared to suit the samples' ages. ✓ Both groups attended the English classes for 80 minutes per week. CG followed the regular curriculum while the EG was supported with digital game-based learning activities. ✓ Both pre-posttests included 30 questions that were graded out of 30 points, including 30 vocabulary items with a maximum score of 30 were administered to the groups to discover the participants' level of knowledge in English vocabulary.

Study 1. The sample of this study consists of 97 male and female students.They were deliberately selected from the Kofor Awaan Girls School and Abu IsamPrimary Boys School which was distributed over two groups. One of them is an experimental group comprising 52 male and female students taught English language vocabulary through a computer game strategy. In comparison, the other is a control group of 47 combined male and female students.

Study 8. This study has 37 third-grade students from 2 separate classes. A class of 20 students was identified as the experimental group, and another class of 17 students was assigned as the control group. The participating school was a public primary school in Turkey. Two third-grade classes were randomly selected to participate in this study. The participants were 37 students (18 boys and 19 girls), ranging in age from 8 years to 9 years (M =8 years and five months). The experimental group (N = 20) included seven girls and 13 boys, and the control group (N = 12) involved five boys and 12 girls.

Table 5
Fourth Grade Pupils in the Included Studies

Study 2 Rabu and Talib	Study 3 Mehrpour and Ghayour	Study 4 Chen and Lee
✓ 70 year-four students from one of the rural primary schools were selected ✓ Participants are selected through non-probability purposive sampling ✓ Participants have the same background knowledge ✓ Students have moderate achievement level ✓ Experimental Group – 35 students, experienced DGBL method ✓ Control Group – 35 IML method	✓ 66 young Iranian English learners The average age is 9.5 ✓ Attending the children's branch of Iran Language Institute (ILI) --- the most well-established state-run language teaching institute in Iran. ✓ Experimental Group – 33 students were exposed to a computerized educational game called "Fun Spelling". ✓ Control Group – 33 were taught using the conventional method	✓ The study was conducted with 30 fourth grade students ✓ Approximately 10-year-old on average from two classes at an elementary school in Taiwan. ✓ Students were randomly assigned to make sure they have the same levels of background and knowledge. ✓ Experimental Group –15 students used the My-PetShop ✓ Control Group – 15 students used the quiz game (My-Pet-Rush) developed with the same subject learning.

Study 2. Seventy year-four students from rural primary schools were selected through non-probability purposive sampling from one of the rural national primary schools in the Penaga district, North Seberang Perai. Thirty-five students from the experimental group experienced the DGBL method, while 35 other students from the controlled group experienced the IML method. The students have the same background knowledge; achievement level is moderate based on their KSSR English summative assessment report in the previous year, specifically the students who achieved Level 2 (Band 2), Level 3 (Band 3), and Level 4 (Band 4) during the third year.

Study 3. Sixty-six students from two intact English classes at Iran Language Institute (ILI) took part in this study. The number of students in each class was 33. This type of sampling was based on the following considerations: a) The participants had nearly the same level of proficiency learning English for two years; b) they had been taught through the same teaching materials and procedures, and; c) taught with teachers having nearly the same level of proficiency and efficiency. One of the classes was randomly assigned to the experimental group, in which the students were exposed to a computerized educational game called "Fun Spelling." The other class was assigned to the control group, where the learners did their homework in a conventional way throughout the term. Three instruments were used to collect the data: a pre and post-English spelling test for the experimental group, a pre and post-English spelling test for the control group, a pre-and-post dictation test of homophones, and a pre-and-post dictation test of English words with silent letters.

Study 4. This study was conducted on 30 fourth-grade Taiwanese students with an approximate average age of ten years old. The elementary school had a policy of normal distribution and randomly assigned students on that basis to classes at the start of the school year to make sure that each class included students with various levels of background and knowledge. Accordingly, it can be assumed that the students in each of the two classes had uniform learning backgrounds and abilities. The two classes were randomly assigned to either an experimental group (EG, n = 15) or the control group (CG, n = 15).

The majority of the participants in the nine research studies come from the third and fourth grades. The smallest number of participants comes from study 5, which was participated by 30 participants ---15 participants in both control and experimental groups. The largest number of participants in the collection of studies comes from study 10, containing 100 participants with an unequal distribution of 45 in the experimental group and 55 from the control group. Five of the studies have unequal participants' allocation while the other five studies equally distributed the students in both control and experimental groups.

Intervention

"I" in PICO stands for intervention. It answers the question, what intervention or exposure am I considering? The interventions are used to determine the effectiveness of an outcome of interest. Table 6 presents the interventions used in the included studies. Seven different interventions were used in the included studies. These are Computer/Mobile/Online Games, Fun Spelling, Video Games, SHAIEx Digital Game, Speed Word Game, Educational Games named My-Pet-Shop, Digital Games on EBA (Education Informatics Network) platform.

Computer/ Mobile/Online Games	Fun Spelling	Video Games	SHAIEx Digital Game	Speed Word Game	Educational Game named My-Pet-Shop	Digital Games on EBA (Education Informatics Network) platform
✓ Studies 1,5 and 9 ✓ Study 1. This electronic educational game has exciting features like motion, colors, and stimulation that increased interaction with the vocabulary, giving learners the proper sense of the game elements that facilitate representing semantics. ✓ Learners can easily remember and connect their mental and coding processes through this game. ✓ Study 5. created the mobile game in collaboration with SmartyPal, Philadelphia ✓ Study 9.	✓ Study 3 ✓ Fun Spelling helps players learn and memorize the spelling of new words while having fun. ✓ This gameis designed with bright colors, amusing sounds, and fun graphics to appeal to the children.	✓ Study 6 ✓ Games used the official site of the British Council to teach vocabulary.	✓ Study 7 ✓ The computerized multimedia application involves different audiovisual means to represent the information (e.g., text, images, sound, and video).	✓ Study 2 ✓ This study used Speed Word Game for a vocabulary set entitled “Adjectives for People” that applies a game-based learning approach as a platform for students from the experimental group receiving the DGBL method.	✓ Study 4 ✓ The My-Pet-Shop system is developed based on an application-driven model comprised of three components: application context, subject learning, and learning regulation. ✓ The model first assesses students’ applicability in a set of learning scenarios, promotes their awareness of learning status via visual representation, and encourages them to improve learning status.	✓ Study 8 ✓ EBA is pre-controlled by the Turkish Ministry of Education ✓ Games in EBA were used for enhancing vocabulary teaching in a public primary school in Turkey.

Online games that instruct particular vocabularies						

Table 6
Interventions Used in the Included Studies

Computer Game/Mobile Game. Mobile games are digital games played on smartphones or other mobile devices like iPads, iPods, and tablet computers. This digital game focused on teaching third graders English language vocabulary. Games help teachers create a context where useful and meaningful language contributes to the teachers and students toward a better understanding of vocabulary through educational games. On the other hand, the target focus of the mobile game is to let children learn ten new words that require their use knowledge of word meanings. The researchers created the mobile game in collaboration with SmartyPal, a Philadelphia-based educational development company; SmartyPal created static cartoon-style images for the game. Researchers wrote the game script and logic of gameplay. Finally, online games were used in study 9 to instruct learners on specific vocabularies.

Fun Spelling. A computerized educational game was designed and implemented to help children learn English spelling. Fun Spelling helps players learn and memorize the spelling of new words while having fun. Twelve stages were developed in the Fun Spelling game. In the children's branch of the Iran Language Institute (ILI), twelve levels must be completed if language learners wish to improve their knowledge of the language and move on to higher levels of English proficiency. The words used in this game were taken from the textbooks taught in the kids' branch of the Iran Language Institute. Fun Spelling is designed with bright colors, amusing sounds, and fun graphics to appeal to the children.

Video Games. Video Games' based language learning focuses on Video Games as a virtual environment that supports language learning on its own and Video Games as a tool. Video Games develop creative problem-solving skills, exercise, improve hand-eye coordination, exercise control in challenging circumstances, be persistent, pay attention to detail and think strategically and laterally, and linearly and logically (Song,2008).

SHAIEx Digital Game. SHAIEX (Sistema Hipermedia Adaptativo para la ensenanza de idiomas en entorno Linex) stands for Adaptive Hypermedia System for the Teaching of Languages at Early Ages built-in Linux. It is a long-term government-funded project being developed since 2004 at the University of Extremadura by the interdisciplinary research team GexCALL (Research Group for Computer-Assisted Language Learning). Hypermedia is designed as a result of linking two technologies: multimedia and hypertext. A computerized multimedia application involves different audiovisual means to represent the information (e.g., text, images, sound, and video).

On the other hand, the hypertext consists of a series of text blocks connected or linked among themselves so that users can pass from one block to another in the order they wish and according to the user's needs, interests, and point of view. Consequently, hypermedia allows us to structure the information in a non-sequential way and integrate different means (i.e., text, graphics, sound, and video). The hypermedia benefits in the learning process are unquestionable. On the one hand, it enables the student to explore the knowledge depending on their necessities and goals freely. On the other hand, the information is transmitted using different sensory channels, necessary in the didactic process. However, in these systems, the student can freely explore the knowledge (information) appropriate or not to the student's cognitive level.

Speed Word Game. Speed Word Game is an educational game where instructional content of the English as a Second Language (ESL) and English as a Foreign Language (EFL) vocabularies are blurred with game characteristics such as control, interactivity, rules, goal, challenge, and curiosity (Pivec et al., 2003). When participants first entered the Speed Word Game, they were given options to choose their timing speed of gameplay, from fast (20 seconds for each word) to faster (15 seconds for each word) and too furious (10 seconds for each word). Control or choice is one of the game characteristics that give the participants the possibility to choose different options to accomplish a goal. This digital game consisted of four sections that

cover 24 words: (i) Every Other Letter Game; (ii) First & Last Game; (iii) Missing Vowels Game; and (iv) Missing Consonants Game.

My Pet Shop. The My-Pet-Shop system is developed based on an application-driven model comprised of three components ---application context, subject learning, and learning regulation. The model first assesses students' applicability in a set of learning scenarios, promotes their awareness of learning status via visual representation, and encourages them to improve learning status.Players in the My-Pet-Shop system play the role of "shop manager" who needs to satisfy the needs of computer-simulated customers and interact with them in different scenarios. Customers go to the pet shop to ask for other services, such as buying food to feed their pets, taking their pets for grooming, or seeking medical attention. Thus, the students are required to apply appropriate vocabulary to respond to the customers via a set of multiple-choice questions. The students need to choose the correct word in the given scenario; therefore, the application scenario offers situations for the students to apply what they have learned.

Digital Games on EBA (Education Informatics Network) platform. EBA is a platform designed to be used by both teachers and students online and offline at school or out of school. Through EBA, teachers can upload and download multimedia content and use them for educational purposes. Although there are other platforms to play digital games in classes, EBA is pre-controlled by the Turkish Ministry of Education and is an easy-to-use and intuitive tool that promotes motivation and competitiveness. Therefore, this research is aimed at using digital games on EBA to teach vocabulary.

Table 7 presents the researchers' application of the intervention mentioned in Table 6. The researchers in the included studies described how they apply the intervention during the conduct of their research.

Computer/Mobile/Online Game. This intervention was a programmed computer game to teach third-graders English language vocabulary. An English vocabulary pre-test and posttest were conducted according to the teaching method, sex, and the interaction between them. The mobile game used was attractive, colorful images but did not include extraneous hot spots or sound effects unrelated to the vocabulary. These can be entertaining but also distracting. The whole gaming experience took 10 to 12 minutes to play through. Little adult guidance or interaction with children during gameplay was observed. Participants received no training before gameplay; children were only told that they would be playing a game. Immediately following the game, children completed a receptive vocabulary test.

Table 7
Researchers Application of the Intervention

Computer/Mobile /Online Games	Fun Spelling	Video Games	SHAIEx Digital Game	Speed Word Game	Educational Game named My-Pet-Shop	Digital Games on EBA (Education Informatics Network) platform

✓ Study 1, 5 and 9 ✓ *Study 1.* The application of the game took place in the academic year 2016-2017. ✓ *Study 5.* The game took 10 to 12 minutes to play through. ✓ Little adult guidance or interaction ✓ Children received no training before gameplay; children were only told that they would be playing a game. ✓ Immediately following the game, children completed a receptive vocabulary test. ✓ Study 9. ✓ The experimental group received eight weeks of instructions concerning English vocabulary. ✓ They were instructed specific vocabularies using online games	✓ Study 3 ✓ The researchers constructed three dictation tests of English words, English homophones, and English words with silent letters (each consisting of 30 items). ✓ These tests have high-reliability indexes.	✓ Study 6 ✓ Installed software in computers ✓ It was done in a 60-day teaching period, which consisted of three 60-minute sessions during the week.	✓ Study 7 ✓ The experiment was done in a 45-day teaching period, which consisted of three 90-minute sessions during the week	✓ Study 2 ✓ The study was conducted for five (5) weeks with one (1) hour of treatment for each week. ✓ The experimental group was taught using DGBL ✓ The Control group was conducted through Interactive Multimedia Application (IML) ✓ Both experimental and controlled group participants were given written post-test for 40 minutes.	✓ Study 4 ✓ Students were given 5 minutes of instruction on how to use the system. ✓ The experimental group used the My-Pet-Shop for two 35-minute sessions over two weeks.	✓ Study 8 ✓ The English class was conducted for 80 minutes per week. ✓ The Control group followed the regular curriculum ✓ The experimental group was supported with digital game-based learning activities. ✓ Followed a pre-test-post-test experimental-control group design to determine how far digital games would improve the students' vocabulary.

An online game was utilized under study 9 and conducted to the experimental group for eight weeks of instruction. These online games were conducted to instruct certain vocabularies words.

Fun Spelling. **The experiment started by conducting the class in a conventional way, both in ten** sessions. On the tenth session of the term, a pretest was conducted. For the subsequent ten sessions, each group was then exposed to DGBL and other conventional methods. At the end of the twentieth session, a posttest was administered. Three instruments were used to collect the data: a pre-and-post English spelling test for the experimental group, a pre-and- post English spelling test for the control group, a pre-and-post dictation test of homophones, and a pre-and-post dictation test of English words with silent letters.

Video Games. In this intervention, computers are equipped with the appropriate Video Games software installed, blackboard, marker, flashcards, and posters for learning. Parts of the body, animals, colors and family members were categories used in this study, in addition to a validated Pre-Post vocabulary test. The entire experiment was conducted during a 60-day teaching period, which consisted of three 60-minute sessions during the week.

SHAIEx Digital Game. The process was done within a 45-day teaching period, which consisted of three 90-minute sessions during the week. This digital game software consisted of seven didactic units and comprised points of interest for pre-schoolers. Each didactic unit includes four blocks of activities: presentation, interaction, evaluation, and review. SHAIEx automatically searches for activity scenes of the selected unit according to his educational level and whose prerequisites have been satisfied by the newly acquired knowledge. A transition scene is dynamically generated and presented to the child. This type of scene contains graphical, audible, and clickable icons showing links to the subsequent activities that the child could carry out. At the end of the experimental period, both groups of children undertook a final vocabulary test.

Speed Word Game. The experimental group was taught using Digital Game-Based Learning (DGBL) while the control group using Interactive Multimedia Application (IML). Thirty-five students from the experimental group were taken to the first computer laboratory to undergo the DGBL method. In comparison, another 35 students from the controlled group were brought to the second computer lab to experience the IML method, monitored by researchers and school computer technicians. The learners were given demonstrations about the icons contained in the DGBL and IML. After this study was conducted for five (5) weeks with one (1) hour treatment each week, both experimental and controlled group participants were given a written post-test for 40 minutes.

My Pet-Shop. My-Pet-Shop system is developed based on the application- driven model to support English vocabulary learning. An educational game consists of three components: application scenario, subject learning, and learning regulation. The model first assesses students' applicability in a set of learning scenarios, promotes their awareness of learning status via visual representation, and encourages them to improve learning status.

Digital Games on EBA (Education Informatics Network) Platform. From the two groups formed, 1 received English classes that included digital games on EBA, and the other took regular classes. Both studied vocabularies related to numbers, family members, adjectives, feelings, toys, and games. This study followed a pre-test-post-test experimental-control group design to determine how far digital games would improve the students' vocabulary. Both the control and experimental group attended the English classes for 80 minutes per week. The former followed the regular curriculum while the latter was supported with digital game-based learning activities.
Comparator

"C" in PICO denotes the comparator. Comparators are points of reference to test the efficacy of an intervention, exposure, test, or agent against a control group to see if it has any meaningful effect above other treatments or nothing at all. These are the group of students, teachers, or schools that does not participate in the intervention. The challenge in most educational research interventions is to find or create a comparison group. To maximize the validity of the comparison, these two groups must be as similar as possible in terms of characteristics before implementing the intervention. To do this, the evaluator needs data on baseline characteristics of schools, teachers, or students.

There are four identified comparators in these ten included studies shown in Table 8. These are the Non-DGBL Instruction/ Regular Instruction, Conventional Instruction/Traditional Instruction, Interactive Multimedia Learning (IML), and Quiz Game. The researchers also described their experiences and observations in applying the said comparators.

Table 8
Comparators Used in the Included Studies

Non-DGBL Instruction/ Regular Instruction	Conventional Instruction/Traditional Instruction	Interactive Multimedia Learning (IML)	Quiz Game
✓ Studies 1 and 5 ✓ No exposure to Digital games ✓ Students are receivers of information, direct instruction, drill, practice structural techniques ✓ traditional way	✓ Studies 3, 6, 7, 8 and 9 ✓ learners did their homework in a conventional way ✓ Threatening environment ✓ repeating after the teacher all the time ✓ not receiving DGBL instruction and practice followed the regular curriculum ✓ regular curriculum using the textbook, audio recordings, worksheets, tracing; and cut and paste activities ✓ the main focus was drilling and memorizing	✓ Study 2 ✓ Researcher-developed interactive multimedia application (IML) using Microsoft PowerPoint software. ✓ IML consisted of 24 vocabularies as found in the DGBL. ✓ The researchers included texts, images, background music, animation, and interactivity in IML	✓ Study 4 ✓ developed with the same subject learning. ✓ Had 60 English words as the subject domain ✓ This is a game system with no developed application scenario and learning regulation.

Non-DGBL / Regular Instruction. The comparator of studies 1 and 5 are non-exposure to Digital Game-Based Learning or Regular Instruction. This is a traditional instruction where lessons are driven through direct instruction using textbooks and other non-digital learning materials.

Conventional /Traditional Instruction. Studies 3, 6, 7, 8, and 9 used conventional instruction. In this setting, learners conventionally did their homework throughout the term in a threatening environment. Lessons are described as “repeating after the teacher” all the time aimlessly. Participants are not receiving DGBL instruction and practice. This type of teaching followed the regular curriculum. Teachers taught the regular curriculum using the textbook, audio recordings, worksheets, tracing, and cut and paste activities. Words are to be memorized, and pictures are given by the teacher from textbooks and other materials. The main focus of the traditional teaching was drilling and memorizing.

Interactive Multimedia Learning (IML). Study 2 used a researcher- developed interactive multimedia application (IML) using Microsoft PowerPoint software. It consisted of 24 vocabularies as found in the DGBL. The researchers included texts, images, background music, animation, and interactivity in IML to attract and enhance students' understanding of this topic.
Quiz Game. Study 4 utilized a quiz game as a comparator. It contains the same subject learning in the games used in the experimental group and no developed application scenario and learning regulation. It includes 60 English words as the subject domain.

Outcome
“O” denotes the outcome in the PICO framework. This is the expected result or what the researcher would like to measure or achieve. It represents the result a researcher plans on measuring to examine the effectiveness of the intervention.

Table 9 presents the outcome of the nine included studies. All of the results favor the experimental group (EG), which means that the experimental group's mean post-test is higher than the controlled group (CG).

Experimental Group being Favorable

Significant Difference. Eight included studies' outcomes resulted in significant results in favor of the experimental group. However, one study bears no significant difference.

Outcome 1. The Arithmetic average of the experimental group was (26.795) which is higher than the arithmetic average of the control group (21.002).

The differences were in favor of the experimental group. The study's findings showed that there are statistically significant differences at the level of ($p<0.05$) between the experimental group and the control group in favor of the experimental group. There is also a variation of 57.6% in the Test of English vocabulary in favor of the experimental group.

Outcome 2. The study's descriptive statistic reported that the English vocabulary post-test achievement score for students from the DGBL method (M = 76.83) was found to outperform students' achievement from the IML method (M = 24.57). There was a difference in post-test scores between the two learning methods after the difference in controlled pre-test scores. Based on the table, the DGBL method's mean has outperformed the IML method's mean by 21.72. This means a significant difference in the score of post-test achievement between the DGBL and IML groups. Based on this finding, the researchers have rejected the null hypothesis of the study. Researchers reported that by controlling the pre-test achievement scores, the DGBL treatment method affects fourth-grade students' English vocabulary post-test achievement score. Therefore, fourth-grade students who received DGBL treatment have a higher English vocabulary achievement than those who received IML treatment.

Outcome 3. The results of the t-test showed that the experimental group had significantly outperformed the control group. The mean score of the post-test of dictation of English words of the control group was 16.22, and that of the experimental group was 18.80. A paired sample t-test was analyzed to see the results of their pre-and post-tests of dictation of English words of the students in the experimental group. The experimental group's mean score in the pre-test of dictation was 15.05, and that of the post-test was 18.80. As it can be seen, the difference between the two mean scores is 3.75 points which is more than the difference between the mean scores of the control group (1.64), which reveals that the students in the experimental group had improved their spelling ability much more than the control group due to the application of the spelling game. The study results revealed that playing the computerized educational game had a positive effect on learning English spelling among Iranian children.

Outcome 5. Children who played the game (experimental group) answered a significantly higher proportion of test questions correctly (M = .54, SD = .22) than children in the control group who did not play the game (M = .25, SD = .16), $t (54) = 6.1$, $p < .0001$, $d = 1.6$. Children who played the game also answered a significantly higher proportion of questions correctly than would be expected by chance, $t (33)$, $p < .0001$ $d = 1.3$, whereas children in the control group did not, $p = 1$. Children demonstrated vocabulary learning from a mobile game in both studies suggests that parents and educators could capitalize on children's attraction to digital media devices for positive effects.

Outcome 6. Through Covariance Analysis the results found out that there was a significant difference at ($\alpha=0.05$) between the means of students' scores on the post-test attributed to the teaching method in favor of the members of the experimental group (M=22.19, SD=3.72) compared to the control group (M=18.083, SD=3.85). The effect size (45.1) indicated that using Video Games to teach English vocabulary for Saudi kindergarten students positively affected their achievement in the experimental group.

Outcome 7. The results revealed that the mean score in the experimental group was higher than that of the control group. The independent t-test analysis indicated that the two means are significantly different from each other t(38) =2.10, p=0.042. It can be concluded that using the digital game in learning English vocabulary was much more successful in children. Using such games in the classroom results in better motivation and facilitates children's learning process and cognitive achievement. The learning process becomes much more enjoyable, and by engaging children in such games, the stresses involved in the learning process are drastically reduced.

Outcome 8. After the post-test was administered to both groups, the results show that students in the experimental group increased their scores (t= 2.134, p=.04). These results show that the use of digital games helped the students in the experimental group increase their EFL vocabulary knowledge. This means that the use of digital games was an effective tool to enhance vocabulary in these students. For the control group, the increase in the post-test scores might be attributed to the regular teaching process that English teachers followed as part of the primary school curriculum. The post-test results indicated that after a semester of exposure to the digital game-based activities, the experimental group's post-test scores were significantly higher than those of the control group. This implies that the intervention had a significant positive effect on the vocabulary knowledge of 3rd grade EFL learners.

Outcome 9. The post-test of the experimental group (M=82.09, SD=8.559) and the control group (M=77.05, SD=10.286) presented a statistically significant difference in favor of the experimental group. This indicated that using online games for teaching English vocabulary for kindergarten students may have had a positive effect on children's performance in the English language. There was also a statistically significant difference (p=0.001) on the post-test in favor of the experimental group. To sum up, the researchers believe that the differences in the achievements of the kindergarten children were referred to their use of online games for teaching English vocabulary. The experimental group subjects tried to develop English vocabulary they already have in eight weeks, contrary to the control group learners whose improvements were not statistically significant. Moreover, the researchers indicated that the progress achieved by the experimental group might have been attributed to the way the teachers provide pedagogy and instructions using online games. In other words, students were more involved in learning when they were given the opportunity to use online games to learn new vocabulary and have fun at the same time.

No Significant Difference

Outcome 4. The results of the t-tests revealed that the scores of the post- test were significantly higher than those of the pre-test in both the Experimental group ($t = 6.72$, $p < .01$) and the Control group ($t = 7.72$, $p < .01$). This implies that both of the systems were beneficial for enhancing student performance. In addition, ANCOVA results show no significant difference between the post-test scores of the two groups. In other words, the My-Pet-Shop system did not have a more enhanced impact on learning performance than the other system.

A possible explanation for this research was that both systems contained theme-based materials, offering students opportunities to improve their vocabulary learning effectively. Thus, both the experimental and control groups' students obtained significant improvement in the performance tests. This might be the reason why no significant difference existed between the two groups. In addition, although My-Pet-Shop had additional components (i.e., scenario application and learning regulation) that might be helpful for students' goal setting and reflection, this study is a short-duration experiment (only two 35 minutes sessions). It might be a possible reason for not revealing a significant difference between the two groups.

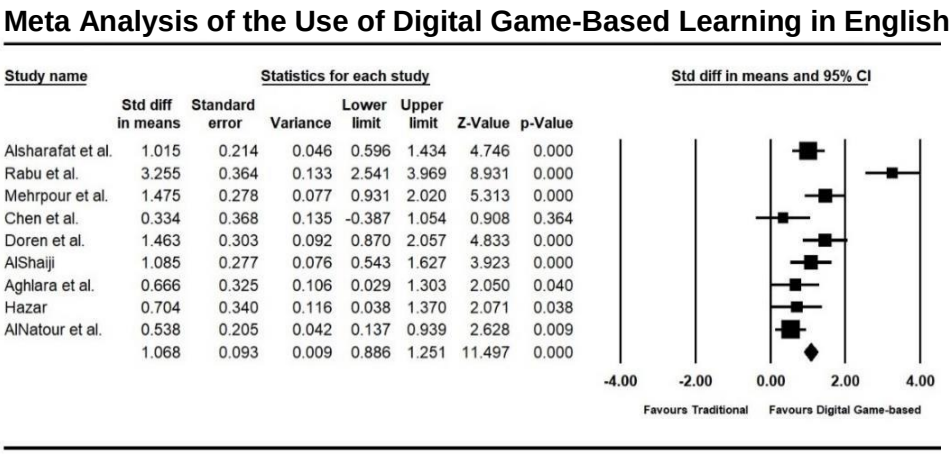

Figure 3. Forest Plot

Forest Plot. A key aspect of a meta-analysis is presenting the data in a format called a forest plot or a meta-view. It displays statistical information from multiple relevant studies related to the same topic or question. It is essentially a one-stop-shop to compare the results of multiple studies rather than reviewing each one individually. It is used to display results for meta-analysis studies graphically. Figure 3 depicts the forest plot for the standardized mean differences (SMDs) in the measurement outcomes between the experimental and control groups of the quasi-experimental studies assessing the effectiveness of digital game-based learning in English proficiency of early primary students.

Effect Size and the Null Effect Vertical Line. Ahmad (2018) elaborated that effect size refers to the strength of association between variables (independent variables with the Dependent variable). It is essential to determine the effect size because it helps to calculate the needed sample size. The possible range of effect size is 0 to 1. The larger the effect size, means the smaller the required sample. As illustrated by McLeod (2019), Jacob Cohen suggested that an SMD between zero and 0.2 can be interpreted as a small effect, between 0.2 and 0.5as a moderate effect, and 0.8 as a large effect. From the average SMD of the figure above, it can be interpreted that it has a significant effect.

Shown in the forest plot is the line of no effect, which is the vertical line placed at the value 0.00 where there is no difference between the treatment and the control group. The x-axis indicating the effect size is being compared among the selected studies.
Standardized mean difference is a summary statistic used when the studies in a meta-analysis assess the same outcome but measure it differently. Each SMD value was computed based on the sample size of the control and experimental groups and its corresponding t-value of the post-test. The treatment or intervention is considered effective if the experimental group's mean is greater than that of the control (Borenstein, 2018). As shown, the x-axis is conveniently set at a range of
-4.00 to +4.0.

The line of no effect indicates no significant difference in the outcomes between the control and experimental groups. The SMDs to the right denote an effective intervention; that is, the measured outcome for the control is less than that of the experimental. Meanwhile, SMDs to the left of the line favors the control group (Borenstein, 2018).

Overall SMD. The diamond at the bottom is the weighted average for all studies. This summary evaluation summarizes all of the evidence in the experimental group or the control group. The black diamond in Figure 3 presented the overall SMD = 1.068 with p-value = 0.000, and it is described as a significant "large" effect, as suggested by Cohen. The result indicates that the experimental group's outcome of 1.068 is higher than the control group implying the intervention's effectiveness. Correspondingly, the 95% confidence interval is 0.886 to 1.251, indicating 95% certainty that the true SMD lies within this range of values.

It is also evident from the figure above that the diamond at the bottom of the graph did not touch the line of no effect; hence, the overall results were statistically significant. The diamond is more to the right; thus, there are more episodes of outcome for the treatment group. This favors the treatment group since the black diamond, and both ends are to the right of the centerline.

Heterogeneity. A systematic review and meta-analysis aim to combine studies to give a more precise estimate of effect. An important decision that the systematic reviewers need to decide is whether it's appropriate to combine studies. Heterogeneity in meta-analysis refers to the diversity in study outcomes between studies. Seibert (2018) clarified that heterogeneity means variability in the given data. Thus, if one brings together different studies for a meta-analysis, it is clear that there will be differences found. Notably, there are different types of heterogeneity: a.) differences in participants, interventions, or outcomes (Clinical); b.) differences in study design, risk of bias (Methodological), and c.) variation in intervention effects or results (Statistical).

Table 10 presents the statistical parameters generated by the Comprehensive Meta-Analysis (CMA) software. Cochran's Q test is a test for heterogeneity in meta-analyses. It generates a probability that, when large, indicates larger variation across studies rather than within-subjects within a study. The underlying null hypothesis assumes that the true treatment effect is the same across studies, and variations are caused by chance. Meanwhile, the I2 index is a more recent approach to quantify heterogeneity in meta-analyses. I2 provides an estimate of the percentage of variability in results across studies due to real differences and not due to chance (West, SL., Gartlehner, G., Mansfield AJ., et al., 2010).

Table 10
Heterogeneity

Heterogeneity				Tau-squared			
Q value	df(Q)	p-value	I-squared	Tau squared	Standard Error	Variance	Tau
53.316	8	0.000	84.995	0.451	0.281	0.079	0.672

Q-**value.** The Cochran's Q = 53.316 with p-value = 0.000 indicates that the individual studies' SMDs do not statistically evaluate the same effect size regarding the overall SMD. It suggests that there are indeed genuine differences underlying the results of the studies. Although the power of Q, in this case, is not high due to the limited number of included studies, there is a hint of heterogeneity of these studies (Borenstein, 2018).

I2-test. I2-test is another formal test for heterogeneity. The lower the I squared, the less heterogeneity there is, which means that's better and less variability between the studies. The Cochrane Handbook for Systematic Reviews for Interventions (2021) has a rough guide for interpreting I2. They suggest that I2 from 0 to 40 presents minimal heterogeneity, from 30 to 60 means moderate heterogeneity; 50 to 90 represent substantial heterogeneity, while 75 to 100

can be interpreted as considerable heterogeneity. As demonstrated in the same table, this collection of studies has established an I2 = 84.995%.

This substantial heterogeneity suggested that the studies in this meta-analysis cannot be considered studies of the same population (Borenstein, 2018).

Tau Squared. T2 are measures of the dispersion of true effect sizes between studies in terms of the scale of the effect size. It is also an estimate of the variance of the true effect sizes. T2 also represents the absolute value of the true variance (heterogeneity). In this study, the CMA software-generated that the true effect sizes between 9 studies are dispersed at 0.451 in terms of the scale of the effect size.

Funnel Plot for the Selected Studies. Locating all studies from the inclusion criteria being set is rarely possible in the real world. Even in the advent of electronic searching, there would be instances that some studies will escape our search and not be included in the analysis. Borenstein et al. (2009) emphasized that "if the missing studies are a random subset of all relevant studies, the failure to include these studies will result in less information, wider confidence intervals, and less powerful tests, but will have no systematic impact on the effect size. However, if the missing studies are systematically different than the ones, we were able to locate, then our sample will be biased." Studies that report large effects for a given question are more likely to be published than studies that report smaller effects for the same question, resulting in biased published literature.

One can visualize the results of meta-analysis through a funnel plot. This is a helpful tool to explain how specific bias detection tools work. Every individual dot in this graph is a single study. Every single study is represented as the standardized mean difference of the effect size on the x-axis. On the y-axis, the standard error is the standard deviation divided by the square root of the sample size. Thus, the smaller the standard error, the larger the sample size.

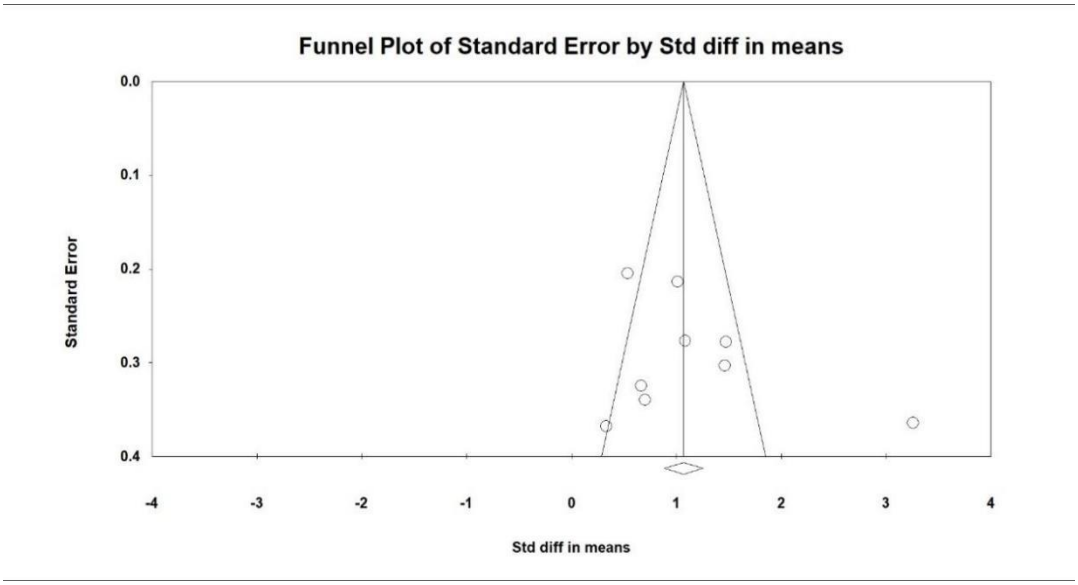

Figure 4 reveals that the funnel plot is scattered asymmetrically around either side of the vertical line, demonstrating the effect size, except for a few studies. The points representing each mean value are widely spread at the base and become narrow as they move to the top, resembling an inverted funnel. The majority of the effect sizes of the studies included in the study are very close to the combined effect size value in the center region. In addition to that, it is seen that the

individual effect sizes of the two studies are outside the funnel, indicating that few studies are missing on the right side in the funnel plot. However, interpretation of a funnel scatter plot is subjective (Rothstein et al., 2005).

Therefore, Rosenthal's Fail-Safe N and Orwin's Fail-Safe N value was also examined in determining the publication bias. Rosenthal's/Classic Fail-Safe N and Orwin's Fail-Safe N. The data were statistically analyzed using "Classic/Rosenthal's Fail-Safe N" (Table 11) and "Orwin's Fail-Safe N" (Table 12), respectively. Tables 11 and 12 presents the generated data from the CMA software. These values revealed vital information to measure the publication bias of this meta-analysis done in 9 included studies.

As shown in Table 12, "Orwin's Fail-Safe N" cannot be determined with the given conditions as established by the meta-analytic data from the selected studies. However, Table 11 indicates the Rosenthal's Fail-Safe N value is 318. The result suggests that a total of 318 studies with zero effect size are needed so that the effect size calculated as a result of meta-analysis is not statistically significant. Furthermore, for the findings of this meta-analysis which consists of 9 research studies, to be deemed invalid, there should be at least 318 studies that contradict the values of the conclusions of the literature. However, these research studies with contrasting findings of 318 are not easily visible.

The formula N/(5k+10) proposed by Mullen et al., (2001) was used to determine how robust Fail-Safe N is to be far from publication bias. If the value exceeds 1, it indicates that the meta-analysis is sufficiently robust for future studies. According to "Rosenthal's Fail-Safe N," this value was 318/ (5*9+10) = 5.782. This value substantially exceeds 1. Based on the statistical data obtained, this meta-analysis seems to be highly robust for possible publication bias for future studies (Mullen, et al., 2001; Borenstein, et al., 2009).

Duval and Tweedie's Trim and Fill Method (TFM). Publication bias was finally analyzed using "Duval and Tweedie's trim and fill method (TFM)." The number of missing studies that might exist in a meta-analysis was estimated using this method. These possible studies were added to the meta-analysis to assess the effect of the missing studies on the overall effect size (Üstün & Eryılmaz, 2014). Table 14 shows the case where the adjusted effect sizes with missing studies added using the "TFM" were added to the right of the mean. On the other hand, in this study, both heterogeneity tests were performed, and graphics were used to determine whether the effect sizes were suitable for normal distribution. According to this, the results regarding the fixed effects model of the studies included in the meta-analysis are presented in Table 13.

Table 13
Duval and Tweedie's Trim and Fill

	Fixed Effects				
	Studies Trimmed	**Point Estimate**	**Lower Limit**	**Upper Limit**	**Q Value**
Observed Values		1.06841	0.88626	1.25056	53.31616
Adjusted Values	0	1.06841	0.88626	1.25056	53.31616

The table above shows a fixed-effects (FE) meta-analysis model (Hedges and Vevea 1998; Rice, Higgins, and Lumley 2018). It assumes that different studies have different effect sizes and that the effect sizes are fixed quantities. By fixed quantities, we mean that the studies included in the meta-analysis define the entire population of interest.

Table 14
Adjusted effect size data by "TFM" (missing studies added to the right ofthe mean)

	Fixed Effects				
	Studies Trimmed	**Point Estimate**	**Lower Limit**	**Upper Limit**	**Q Value**
Observed Values		1.06841	0.88626	1.25056	53.31616
Adjusted Values	2	1.28281	1.12120	1.44443	78.56739

Given the data in Table 14, 2 missing data were added to the right of the mean. After the missing data were added to the right of the mean, the adjusted effect size (Point Estimate) was found to be 1.28281 with a lower limit of 1.12120,an upper limit of 1.44443, and a Q-value of 78.56739. The funnel plot of the adjusted effect size is presented in the figure below.

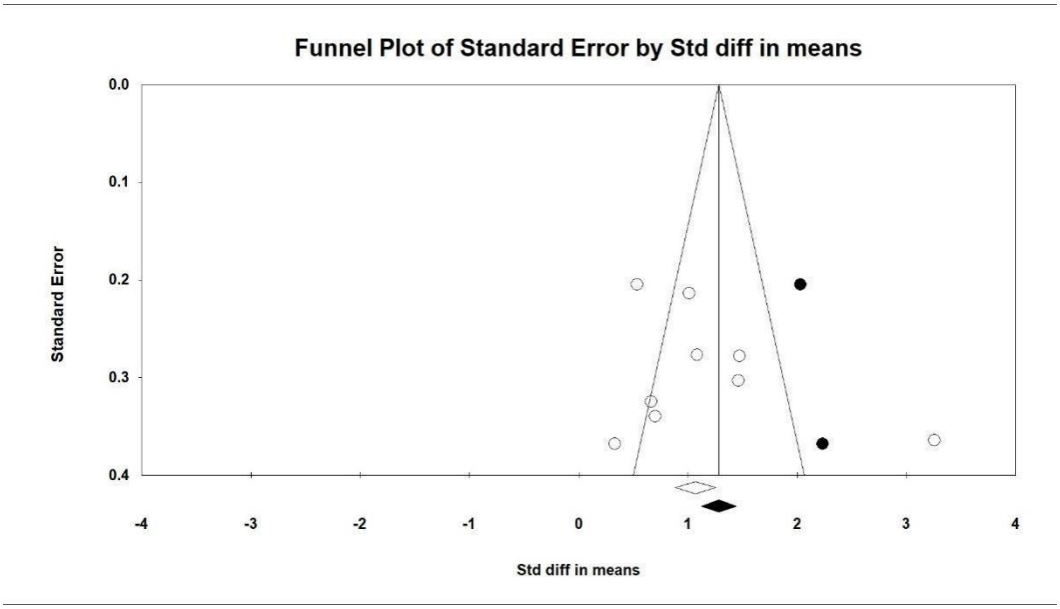

Figure 5. Funnel Plot

Funnel Plots with the Imputed Missing Studies. Publication bias was assessed using funnel plots and the trim-and-fill procedure, which estimates the number of studies missing from the funnel plot, imputes these missing studies to make the funnel plot symmetrical and calculates the effect size adjusted for publication bias.

The figure above shows a bias-corrected funnel plot applying the trim-and-fill method. The open dots indicate the observed studies, and the closed dots indicate the missing studies imputed by the trim-and-fill method. The dashed lines that create a triangular area indicate the 95% confidence limits (under the fixed-effect setting), and the vertical solid line represents the overall effect size. This figure shows that the studies included in the meta-analysis were generally at the center of the inverted funnel, thereby establishing a symmetrical distribution.

"The adjusted effect size (Hedges' g = 1.28281)" and the "overall effect size (Hedges' g = 1.06841)" are the same according to the classification proposed by Cohen et al. (2007, p. 521). Both values represent a large effect size. Given the data on both plots, it can be said that no publication bias would affect the bottom of the plot.

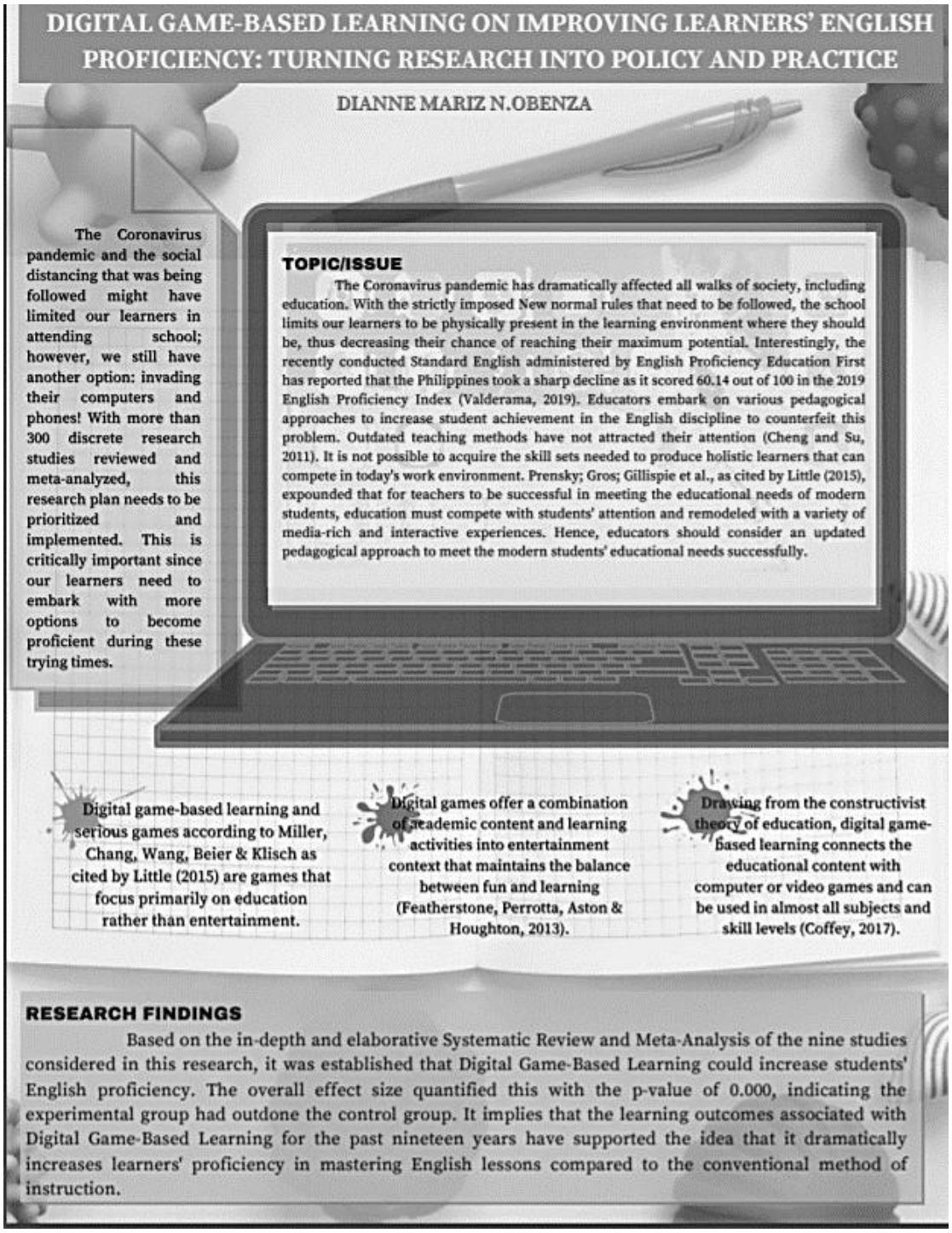

Figure 6. Policy Brief

APPROACH

School administrators should consider several guiding principles regarding the role and implementation of Digital Game-Based Learning in improving the learners' English proficiency.

Digital Game Accessibility: Ensure that games are made available are in an open format that can be downloaded, indexed and searchable to allow automated access.

Open Licensing:
Ensure data are available to the school learners for use at little to no cost.

Digital Game Quality and Timeliness: Digital Games are made available as quickly as possible and frequently enough to remain current and usable.

POLICY RECOMMENDATIONS

There is an exceptionally good alignment between Digital Game-Based Learning and the goal of improving the English proficiency of elementary learners. However, several actions need to be taken by policymakers, subject matter experts, technology experts/game developers, the school administrators, and teachers to meet such goals:

- **School Administrators as teacher-training providers. School administrators should provide teachers with sufficient ICT training to become more familiar with education technology. Teachers need to constantly update their skills in digital adaptation to translate these strategies into classroom practice effectively. These transformation agents should keep themselves at pace to gain a deeper understanding and build familiarity with these tools. Through traversing many avenues of digital games-based training and practical exposure in utilizing these classroom tools, teachers will learn the basic functionality of these structured programs and end-point devices.**

- **Turning teachers to digital classroom leaders.** Teachers who are adept at using digital 'tools' should be trained further on how to become a better mentor, guide, and facilitator who leads a classroom.

- **High-quality games with integration to content.** Game designers/developers need to create high-quality games that integrate game elements and the target curriculum content. To facilitate high-level proficiency, there is a need to customize game designs in order to tailor the content to specific English topics or curriculum goals. These experts should also guide the users in learning the game and equip teachers with knowledge and strategies regarding effective implementation.

- **Financing school leaders and teachers.** Policymakers should consider easy financing options to help teachers and school administrators consider schemes to support teachers to this end. The new normal poses challenges regarding on face-to-face interactions, thus the demand on embarking towards online platforms has been considered as one of the safest options. Through this, learning for students would be productive and at the same time motivating. Therefore, careful consideration of financial decisions among these sectors must be analyzed accordingly.

- **Monitoring, Feedback and Adjustmets.** A quarterly feedback and recommendations should be encouraged to share inputs on relevance of content and usefulness of game structure. It is important to curate common threads among teachers who are facing similar challenges so that they can learn from one another. Collaboration among teachers addresses learning challenges and paves the way to common growth along the teaching-learning process through digital game-based learning.

Policy Brief

Figures 6 shows the policy brief based on systematically reviewed studies across different country settings. It contains the key elements, specifically the overview of the research issue or problem, the examination of findings, and the concluding section that shows the policy recommendations and implications of the research. If approved, this policy brief will be aimed at education policymakers, curriculum specialists, school administrators, teachers, game developers/designers, and other stakeholders. Given the urgency of the New normal situation imposed by the government, this brief has targeted discussions on some policy options for a practical pedagogical approach. It speaks of the benefits and advantages of Digital Game-Based Learning in improving the English proficiency of early primary students. This brief focuses on convincing these target audiences of the urgency of the present problem and the need to adopt Digital Game-Based Learning as a preferred alternative that would serve as an impetus of action. This also intends to structure dialogues with curriculum experts and policymakers in conjunction with school administrators and teachers to overcome the academic constraints on scaling up during the pandemic.

CONCLUSION

Based on the in-depth and elaborative systematic review and meta-analysis of all nine studies in this research, it was established that digital game-based learning could increase the English proficiency of the students. This was quantified by the overall effect size with the p-value of 0.000, indicating the experimental group outdid the control group. It implies that the learning outcomes associated with digital game-based learning over the past nineteen years have supported the idea that it has a great significance in improving learners' proficiency in mastering English lessons compared to conventional instruction methods. The application of digital games like EBA (Education Informatics Network), SHAIEx digital game, to mention a few, have further revealed that it can transform any tedious or difficult aspects like aspects of grammar or vocabulary to be exciting and easier to understand. From all the evidence stated above, it was deduced from the findings of this research study that utilizing digital games positively affects students' learning process in learning English.

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