Research Article

The Power of Gamifographics learning

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Abstract: *YouTube, Instagram, games, animations and infographics are some visual media outlets that Malaysian learners opt for in the 21st-century classroom. Nonetheless, pupils in primary school nowadays are not able to retain English vocabulary due to teachers' chalk-and-talk method in teaching vocabulary. Hence, this research aims to innovate the use of 'Gamifographics' with primary school pupils in learning vocabulary as it is one of the most appealing means to better understand and retain vocabulary. To support the research, four theories are applied which are Cognitivism learning theory, Bloom's Taxonomy, Gamified-Learning Theory and Self-determination theory. A Design and Development Research (DDR) approach, ADDIE Model was employed in the study to innovate the use of 'Gamifographics' with primary school Year 4 pupils in an urban and a suburban school in learning vocabulary. Generally, findings revealed that "Gamifographics" has gained positive perceptions in learning vocabulary as they are visually attractive, easy to understand and remember as well as keep the readers' interest in continuing reading. In addition, "Gamifographics" promotes learning motivation, improves learning engagement and ultimately leads to a positive learning outcome. Thus, it is suggested that utilising of "Gamifographics" in learning vocabulary among primary English learners should be regarded.*

Keywords: Gamifographics; infographics; gamified-learning; primary school; ESL learners

1. INTRODUCTION

The Fourth Industrial Revolution (IR 4.0) is rapidly transforming the world in which we live. In this day and age, infographics have gained popularity in marketing, advertising and social media around the world due to their appealing graphics and meaningful information (Korniush, 2020). According to Lo and Aziz (2022), YouTube, Instagram, games, animations and infographics are some visual media outlets that Malaysian learners opt for in the 21st-century classroom. Instead of reading lengthy or dry papers, readers would rather get insight or a deeper understanding of the text from visually appealing sources. This had a significant impact on how educators conduct effective lessons. As a result, providing the right and appropriate educational materials for this millennial generation is in great demand. Previous researches have shown that learning facts presented graphically is more appealing, simpler to assimilate and digest, and most importantly easier to remember (Korniush, 2020; Nhan & Yen, 2021; Pyankova, 2020; Wu & Kuwajima, 2022). According to Lukas, Patrick, Chong, Jaino & Yunus (2020), possessing a wide range of vocabulary is crucial for learning a language, especially mastering English as a second language. Extensive vocabulary knowledge is deemed to be fundamental before any other language skills like listening, speaking, reading and writing. Nonetheless, pupils in

primary school nowadays are not able to retain English vocabulary due to teachers' chalk-and-talk method in teaching vocabulary (Lo & Aziz, 2022). Hence, teachers nowadays are urged to find ways and look for visual tools to stimulate pupils' interest in learning and improve learning results. Moreover, Yee and Ganapathy (2017) asserted that pupils' lack of opportunities to actively use English vocabulary in daily conversations also results in pupils having fewer real-world experiences to integrate the learning into their daily lives. Ultimately, pupils' learning of vocabulary is hindered. Driven by the interest in infographics and games, the study aims to innovate the use of 'Gamifographics' in learning vocabulary among primary school pupils. Literally, "Gamifographics" is a combination of infographics and games that aims to leverage the use of appealing means to aid vocabulary learning and retention in pupils. Thus, two following research questions were formulated in this study:

1. What are the effects of using gamifographics in learning vocabulary?
2. To what extent, gamifographics help pupils in learning vocabulary?

2. LITERATURE REVIEW

2.1 Infographics

With the development of technology and the onslaught of social media distractions, the world of academia and educators are facing significant challenges in motivating pupils to learn. According to Hameed and Jabeen (2022), the traditional chalk-and-talk teaching method poses boredom among pupils in this current digital era as the tech-savvy generations have been bombarded with multimedia sources and technology. In light of this, infographics emerged as one of the useful and meaningful tools for capturing learners' attention and interest, which plays a significant role in promoting and enhancing a better learning process. As the term implies, 'infographics' is a combination of information and graphics. It mixes two data modes in one layout to captivate readers and grab their attention. According to Hameed and Jabeen (2022), infographics serve as a tool for visual literacy with these new digital-age learners. It aims to swiftly and clearly communicate information through the visual presentation of any data or information. Khan (2021) also claims that infographics are generated using graphic data or information with the goal of better illustrating and explaining complex information. As a result of its ability to help educators clearly and vividly explain complex information, it has the potential to promote readers' involvement, engagement and comprehension. An effective infographic has three key components: a good header, structured ideas and eye-catching visuals. Evidently, an excellent infographic with an appropriate heading is sufficient to stimulate pupils' prior knowledge. Additionally, well-organized ideas and appealing graphics are helpful and beneficial in igniting learners' imagination and connection to knowledge.

Many academics and researchers have attempted to use infographics in a range of educational contexts which yield positive results. Alrwrle (2017) examined the use of infographics with 165 participants in University English language lessons and reported that infographics benefited students' intellectual due to their high retention of the material, which was communicated aesthetically via infographics. Furthermore, the study also revealed that students perceived infographics are necessary for learning. Infographics have successfully held their interest, kept them focused, made complex information easy to understand, helped them identify key concepts, removed irrelevant information, and organised information into logical groups. Not only that, infographics have improved their understanding of hidden relationships, aided in the connection between prior knowledge and new knowledge, and improved their critical thinking and memory, learning is now more durable and permanent. This is aligned with the research by Khan (2021), infographics are proven to be an effective and engaging tool in English teaching and learning as they encourage students to learn more than

traditional teaching methods. Nhan and Yen (2021) also conducted a study on the impact of using infographics to teach grammar on EFL students' learning motivation. The findings revealed that after the utilization of infographics, EFL students' intrinsic and extrinsic motivation for learning had greatly enhanced. The results from Meatty's research (2020) on infographics for primary school students proved that pupils better comprehended and memorized grammar rules. In addition, the study concluded that pupils' attitude towards learning grammar has significantly improved. Although past research has found infographics to be useful in educational contexts, there is still very little research on the use of infographics in learning vocabulary in primary ESL classrooms, especially in Malaysia. Therefore, there is a need for further research to explore the potential of infographics among English language learners in primary schools.

2.2 Cognitivism theory

Nowadays, having access to information becomes handy and thus learning is seemed to be easier. Learning is defined as the process of acquiring knowledge and skills from accessible information. According to Bystrova (2020), the curriculum design and the style of learning content, which match the cognitive abilities of the learners, have a significant impact on how well students perceive and learn instructional information. According to Alahmad (2020), cognitive abilities are the mechanisms by which our brains process the knowledge we acquire through observing, thinking, imagining, memory, judgement, and problem-solving. Jean Piaget proposed a four-stage cognitive development which are the sensorimotor stage, preoperational stage, concrete operational stage and formal operational stage (Alahmad, 2020). Primary school learners, aged from 7 - 12 years old fall under the concrete operational stage. Importantly, children in this stage undergo seriation, transitivity, classification, decentering, reversibility, conservation, and elimination of egocentrism (Agustina & Ahmad, 2020). Pupils in this stage learn new concepts or knowledge through interaction with an adult or teacher. Hence, Agustina & Ahmad (2020) claimed that teachers play important role in helping pupils to develop their cognitive skills, particularly in the concrete operational stage.

Piaget's cognitive theory (1985) also focuses on the process of learning involves forming new information and integrating it with the learners' prior knowledge. Pupils go through three stages: assimilation, accommodation, and equilibration. Assimilation is the process of fitting new information into existing schemas, accommodation is the modification of existing schemes to incorporate new ideas, and equilibration is the process of striking a balance between applying prior knowledge and changing behaviour to fit newly acquired knowledge (Khan, 2021; Sulistyowati, 2019). As children in the concrete operational stage have not yet developed abstract thinking, they need concrete visuals to capture their senses in order to develop their cognitive abilities. Korniush (2020) then proposed that infographics are the perfect tools for combining informational, visual and digital elements to communicate with learners, influence them and help them voluntarily and readily acquire and digest new information or knowledge. Meatty (2020) investigated the impacts of using infographics on improving grammar learning for primary-stage pupils and their attitudes toward it. The results showed that using infographics yields a better understanding and memory retention among the pupils. Specifically, infographics, which present fascinating information, provide educators with chances to connect what pupils are learning to real-world experiences, impact their learning and make learning more meaningful and interactive. Undoubtedly, pupils find it easier to undergo equilibration and shift from one stage of understanding to another stage. Ozdamli and Ozdal (2018) also found that infographics are beneficial teaching material in the early stage of education as such modelling method is useful for developing children's cognitive skills.

2.3 Bloom's taxonomy

In 1956, Benjamin Bloom and a group of educators developed Bloom's Taxonomy which nowadays has been utilised as the central pillar of the teaching process, particularly with regard to the

learning objectives, the lesson plans and the evaluation procedures (Qasrawi and BeniAbdelraham, 2020). The educational objectives of Bloom's Taxonomy are categorised into three primary groups which are cognitive, affective and psychomotor. Specifically, Bloom's Taxonomy categorises cognitive abilities into six distinct levels: knowledge, comprehension, application, analysis, synthesis and evaluation (Bloom, 1956), and later it was revised in 2001 by Krathwohl. Krathwohl reworked this taxonomy into a more comprehensive framework for education called the Taxonomy for Teaching, Learning, and Assessment (Krathwohl, 2002). Remembering, understanding, applying, analysing, evaluating and creating are the new umbrella terms for the various forms of cognition mentioned in this updated version. The figure below shows the evolution of Bloom's taxonomy.

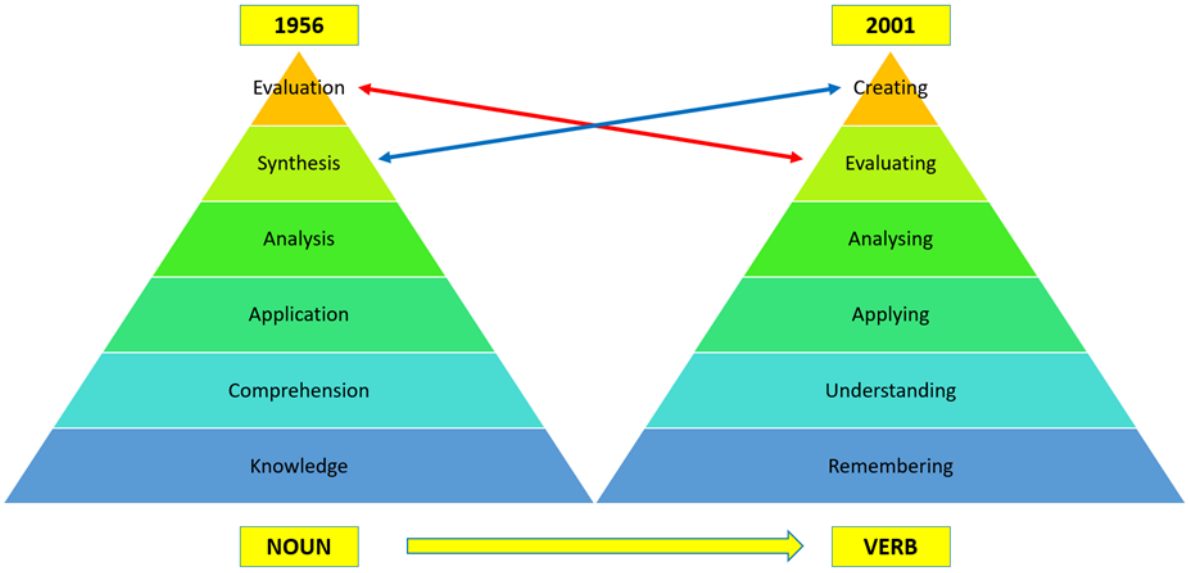

Figure 1: Bloom's taxonomy framework

Same to the first version of Bloom's taxonomy, each of the six levels in the revised version possesses particular qualities. For instance, the remembering level is the level of thinking that can result in the retention of information as well as recognising and recalling of facts. The understanding level requires explaining ideas and interpreting facts. The applying level is the ability to use the information in new situations while the analysing level is the ability to draw connections among ideas. At the evaluating level is to justify a stand or judge the value of information or ideas. Lastly, the creating level is to combine parts to produce new or original work (Krathwohl, 2002). These various levels were separated into two distinct categories: Lower order thinking skills (LOTS) and (Higher order thinking skills) HOTS. According to Bloom (1956), learning does not always begin with lower-order thinking skills however learners can advance to a more difficult and more advanced level of cognitive skills from their initial level.

2.4 Infographics and Bloom's Taxonomy

Infographics contain features that can enhance learners' cognitive skills. As mentioned earlier, an excellent infographic is one of the best ways to stimulate pupils' prior knowledge (Khan 2021) which is the remembering level of Bloom's taxonomy where a person recalls facts. Moreover, an infographic that has a good header, structured ideas and eye-catching visuals able to help learners, especially visual learners to pay attention to the entire appearance of an image as a whole and remember its function

(Menik and Yuhendri, 2016). Infographics also aid in developing the second level of cognition (understanding) in Bloom's taxonomy. Dipa, Utami and Santosa (2022) stated that using visual media, especially infographics as a tool for providing information related to learning for students will have a significant impact on the student's learning process. This includes helping the student to quickly comprehend the points on the learning topic. In addition, Khan (2021) asserted that infographics are visual depictions of data or information, created to aid in understanding and explaining complex information. Furthermore, infographics that contain well-organised ideas and appealing visuals are effective in igniting learners' imagination and helping them to make connections to knowledge (Hameed and Jabeen, 2022). As infographics improve learners' understanding of hidden relationships, help them to make connections between prior knowledge and new knowledge, and thus improve their critical thinking skills. In summary, infographics can boost learners' thinking skills, both lower-order thinking skills and higher-order thinking skills. This is important as the Ministry of Education has always emphasised that higher-order thinking skills (HOTS) are required for pupils to get a deeper comprehension of a specific subject or topic.

2.5 Gamified-learning theory (Gamification)

In accordance with the Industrial Revolution 4.0, gamified learning is gaining in popularity as an innovation to engage ESL learners in their learning process. Manzano-León, et. al. (2021) define gamified learning as a process that incorporates game elements into the non-game environment to boost learners' engagement, motivation and learning. According to Bunchball's (2010) proposal, game elements fall into two categories: mechanics and dynamics. Game mechanics refers to the actions, behaviours, and rules presented to learners in the learning context in order to make a task more like a game and provide learners with more interesting and meaningful learning opportunities. This includes badges, levels, points, virtual goods, leaderboards or trophies. On the contrary, game dynamics refers to the game design that develops, supports, and encourages positive learning behaviour such as reward, status, achievement, satisfaction and fun. Specifically, game dynamics, as mentioned by Bunchball (2010), serve to excite, motivate and accelerate the learners' emotions. In 21st-century teaching and learning experiences, incorporating gamified learning in second-language teaching is inevitable. This is because learners often lose interest in learning a second language as they generally view it as tough, challenging and stressful (Yaccob and Yunus, 2019). However, the incorporation of game elements into language learning has been shown to improve learners' motivation and retention as well as positively affect learning outcomes. This is proven by a study done by Hashim, Rafiq, and Yunus (2019) which discovered that when learners were exposed to gamified-learning interventions like Socrative, PowerPoint Challenge Game, and Kahoot, their scores on a post-test of grammar improved significantly from those of the pre-test. This is because gamified-learning theory increased learners' behavioural, emotional and cognitive involvement. This is in accordance with the findings of Le's study (2021), learners showed increased levels of engagement, effort, and contribution to the learning process through a gamified lesson.

2.6 Self-determination theory

In recent years, the field of language education has embraced the ideas of Self-Determination Theory (SDR). According to Self-Determination Theory, (Deci & Ryan, 1985), there are various sorts of motivation that can be distinguished according to the underlying causes or purposes of individual behaviour. The most fundamental distinction is between intrinsic motivation and extrinsic motivation. In other words, motivated actions can be either self-determined or controlled. Intrinsically motivated behaviours are the most basic type of self-determination behaviour. They are done out of interest and to satisfy the psychological needs for competence and autonomy rather than for some separable consequence. To elaborate further, intrinsic motivation is a common and important form of motivation in humans. In their healthiest stages, humans are active, inquisitive, curious, and lively since birth, ready to learn and explore without further incentives. The tendencies to be interested in new things, to

actively learn, and to use skills in creative ways are not limited to childhood. They are important parts of human nature that affect performance, persistence, and happiness at all stages of life. This innate motivational inclination is important for cognitive, social, and physical development because one's interests build knowledge and abilities.

On the other hand, extrinsically motivated behaviours are led by a separate result. This means learners become self-determined through internalisation and integration. Self Determination Theory has defined four distinct forms of extrinsic motivation. Firstly, external regulation refers to behaviours that are motivated by externally imposed rewards and punishments. It is a sort of motivation that is often perceived as controlled and non-autonomous. Secondly, introjected regulation refers to partially internalised extrinsic motivation. These behaviours are governed by internal rewards of self-esteem for success and the avoidance of negative reinforcement such as feelings of shame, guilt, or fear. Thirdly, in identified regulation, one has a high degree of motivation to participate or behave because they have consciously identified with or personally endorsed the value of an action. Lastly, integrated regulation is the most autonomous type of extrinsic motivation. It means the person not only sees the value of the action but also finds it to be congruent with other core interests and values. To summarise, intrinsic motivation is depending on an individual's interests and enjoyment whereas extrinsic motivation refers to a perception of value where an individual sees the activities as worthwhile. It is important for learners to have motivation in a second language learning. According to Gardner (1959) learners who are highly motivated are more likely to achieve goals than those who are not. There are many factors affecting second language learners in making efforts to adapt to English and one of the major factors is the neglect of motivation in language teaching (Adwani and Shrivastava, 2019). Hence, it is crucial for educators to plan lessons that can promote learning motivation in the classroom to enhance learners' learning and motivate them towards achieving goals.

3. METHOD & MATERIAL

3.1 Research Design

The Design and Development Research (DDR) approach was employed in the study to establish new teaching materials based on specific needs analysis of primary school ESL learners and to test the practicality of the newly-developed materials. Generally, this type of research design consists of three main phases which are the needs analysis phase, the design and development phase and the evaluation phase (Richey and Klein, 2007). ADDIE Model which complies with the Design and Development Research (DDR) approach was chosen. ADDIE model consists of a five-component instructional design process: A - analysis, D - Design, D - Develop, I - Implement and E - Evaluate (Branch, 2009).

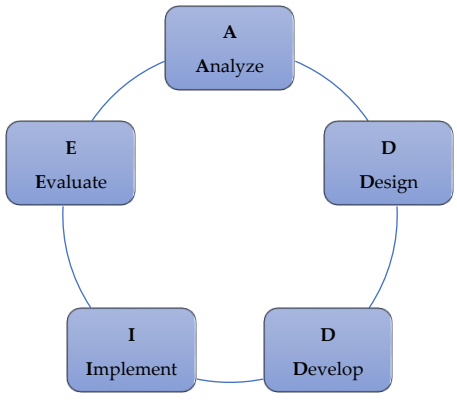

Figure 2: ADDIE Model framework

First, document analysis including pupils' pre-test results was carried out to identify pupils' vocabulary levels. Second, researchers designed reading lessons through PPT using "Gamifographics". Third, "Gamifographics" was validated by several experts including the Head of English panels and experienced English teachers. Fourth, researchers implemented "Gamifographics" in three reading lessons. Last, post-test, interview, observation checklist and questionnaire were used to collect data and evaluate the effectiveness and usefulness of "Gamifographics".

3.2 Participants

Six pupils from a suburban Melaka school and another six pupils from an urban Selangor school were both represented in the sample of Year 4. Data are collected using convenience sampling since the participants are easily approachable (Stratton, 2021). The participants are the pupils who were being taught by the researchers. Table 1 shows the demographics of the participants. The pupils' background has a significant impact on the expected outcome in terms of using the intervention 'Gamifographics' in learning vocabulary.

Table 1. Demographics of Participants

Year 4 pupils' background	Frequency (n)	Percentage (%)
Suburban school	6	50%
Urban school	6	50%

3.3 Research Instruments

The 'Gamifographics' Perceived Usefulness Questionnaire was designed to gauge the impact of the intervention. Moreover, a set of interview questions was utilised to verify the accuracy of the data. Meanwhile, both the pre-test and post-test employed the same set of questions.

3.4 Data Collection

Both the pre-test and the post-test were conducted using a worksheet that has ten questions with multiple-choice answers. The data for the pre-test was first collected when the innovation had not yet been put into practice, whereas the data for the post-test was amassed seven days after the innovation had been implemented. Simultaneously, teachers handed each student a questionnaire to fill out immediately after the implementation of the innovation. Teachers guided the learners through the process of filling out the questionnaire in order to ensure that the students properly understood the statements that were included in the questionnaire. In addition, an interview was conducted in order to gather the learners' thoughts and feelings regarding the innovation.

3.5 Data analysis

The results from the pre-test and post-test are tabulated in a table. The data collected from the pre-test, post-test and questionnaire are then examined using descriptive statistics. In triangulating data, the observation checklist was also utilised. Meanwhile, a back translation of the transcripts of the interviews was conducted. Then, a thematic content analysis was utilised to find common patterns across the data set (Behling & Law, 2000).

4. FINDINGS

4.1 Results from the Pre-Test and Post-Test

The data from the pre-test and post-test in both suburban and urban schools have been documented as shown in Table 2, Figure 1, Table 3 and Figure 2 below.

Table 2: Pre-test and post-test in a suburban school and an urban school

Participants	Pre-test	Post-test
S1	4 / 10	6 / 10
S2	6 / 10	9 / 10
S3	5 / 10	7 / 10
S4	7 / 10	10 / 10
S5	5 / 10	9 / 10
S6	7 / 10	9 / 10
S7	9/10	10/10
S8	4/10	8/10
S9	4/10	8/10
S10	9/10	10/10
S11	9/10	10/10
S12	10/10	10/10

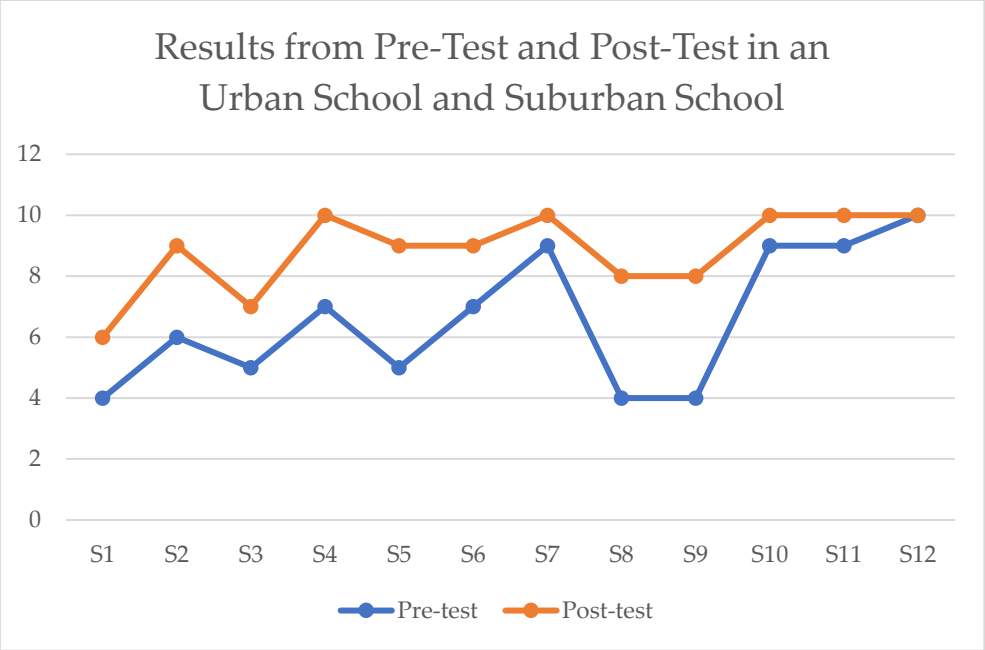

Figure 3: Pre-test and post-test in a suburban school and an urban school

Based on Table 2 and figure 3, it is evident that the post-test score is greater than the pre-test score, with the exception of S12, who answered all questions correctly in both pre-test and post-test. Five out of twelve participants achieved a perfect score (10/10) on the post-test. Although seven participants did not achieve the perfect score, they demonstrated improvement.

Table 3: Mean score of pre-test and post-test in a suburban school and an urban school

	Pre-test	**Post-test**
Suburban school	**5.67**	**8.33**
Urban school	**7.50**	**9.33**

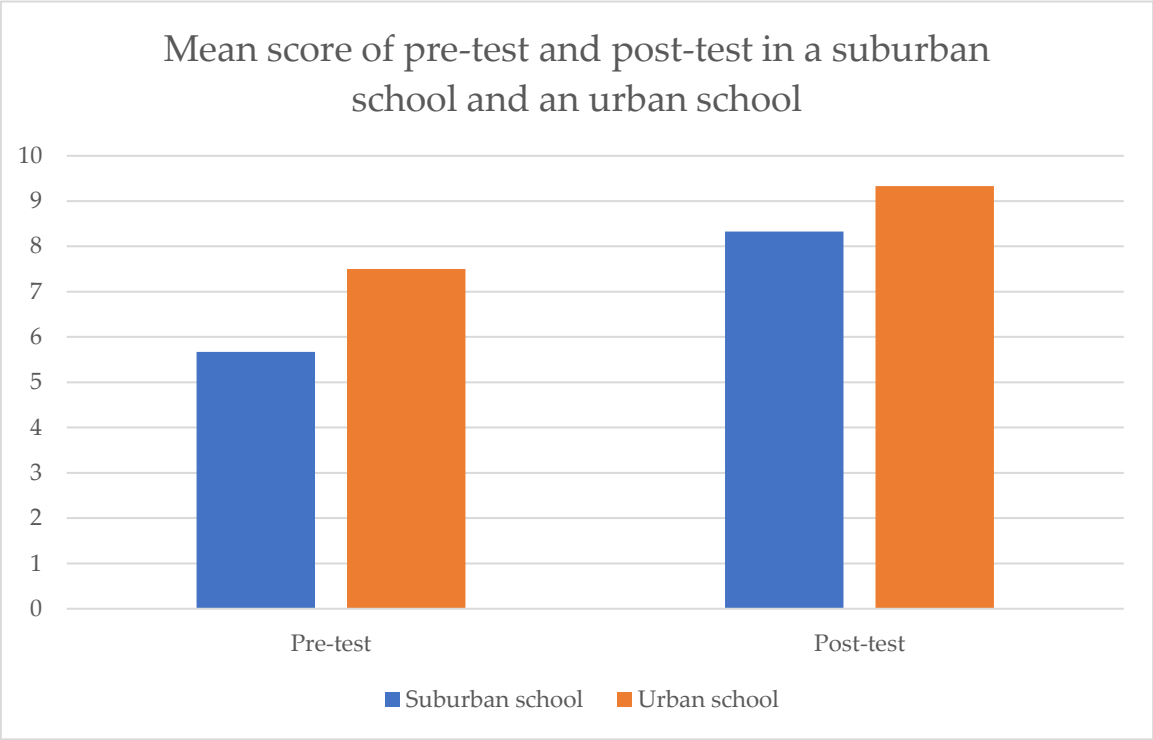

Figure 4: Mean score of pre-test and post-test in a suburban school and an urban school

According to Table 3 and Figure 4, the learners in an urban school scored quite fairly on the pre-test and nearly hit perfection on the post-test. Generally, the pre-test and post-test mean scores are higher in an urban school (7.50 and 9.33 respectively) than in a sub-urban school (5.67 and 8.33 respectively). Although both groups showed improvement, it is obvious that the suburban school learners improved more than the urban school learners.

4.2 Responses from the questionnaire

Table 4 shows the responses and the percentage of the responses from all the respondents.

Table 4: Questionnaire on Gamifographics

No.	Statements	Yes	No
1.	Do you usually read stories?	8	4
		66.67%	33.33%
2.	Have you ever encountered words that you do not understand?	12	0
		100%	0%
3.	Do these words demotivate you to read?	5	7
		41.67%	58.33%
4.	Do you think the infographics help you understand the words better?	12	0
		100%	0%
5.	Do you like answering quick quizzes while reading stories?	12	0
		100%	0%
6.	Do you think these learning methods motivate you to learn English?	11	1
		91.67%	8.33%

With the reference to Table 4, more than half of the respondents (66.67%) indicated that they had the habit of reading stories. All the respondents (100%) had encountered words that could not comprehend, and out of the 12 respondents, 5 of them (41.67%) found these new or difficult words to be demotivating. On the other hand, all the respondents believed that the infographics helped them to understand the words better, and they enjoyed answering quick quizzes while reading stories. Lastly, the majority of the respondents (91.67%) found that these learning methods can motivate them to learn English. However, 1 respondent had a different opinion.

4.3 Thematic analysis from the semi-structured interview

Table 5 shows the selected excerpts and the frequency of each sub-theme that had been mentioned by the interviewees

Table 5: Thematic analysis from the semi-structured interview

Theme	Sub-theme	Excerpts
Useful in vocabulary learning	Better understanding of the words (mentioned by twelve interviewees)	"Saya lebih faham perkataan." [Student #3] "I understand the words better." [Student #5] "I gain meaning of the words." [Student 7]
Arouse learning interest	Higher motivation (mentioned by eight interviewees)	"Saya lebih berniat untuk belajar kalau guna Gamifographics." [Student #4} "Happy to learn words using this. It's fun and challenging. Teacher, can use this next time?" [Student #8] "Gamifographics helps me a lot. I feel like learning more words."[Student #9]
Preferred way in vocabulary learning	Appealing graphics (mentioned by nine interviewees)	"Saya suka infographics. Sebab gambar sangat menarik…senang untuk ingat." [Student #2] "I love infographics. The pictures are colourful and interesting. Dictionary is boring." [Student #5] "I like this… easy to remember the words because the pictures are clear and beautiful." [Students #8]
	Quizzes to test own understanding (mentioned by ten interviewees)	"Quiz itu bagus. Saya dapat check kefahaman saya." [Student #1] "Quiz sangat sesuai untuk mengukuh kefahaman saya." [Student #4] " Teacher, I want more quizzes in the PPT." [Student #9] "Quizzes are fun, I can answer all correctly." [Student #11]

Based on the thematic analysis from the interview, it showed that all of the research participants confirmed the beneficial use of 'Gamifograhics' in helping them to better understand the vocabulary. Moreover, 'Gamifographics' has elevated their motivation and interest in learning English. This is further supported by eight research participants. Two interviewees even asked for another 'Gamifographics' to be used in the reading lesson. Interestingly, from the interview session, researchers found that pupils generally prefer using 'Gamifographics' in learning vocabulary compared to using a dictionary or Pictionary. This is due to the reasons that 'Gamifographics' consists of appealing graphics that enable better retention of the words as well as quizzes that enable them to test their own understanding.

5. DISCUSSION

5.1 Gamifographics and Vocabulary Learning

The aim of this study was to investigate the effectiveness of 'Gamifographics' in vocabulary learning. It was believed that the captivating visual infographics in PPT would make it easier for students to comprehend and retain the new vocabulary. According to the analysis results, regardless of the learners' background (suburban or urban), learners showed significant improvement after the intervention. Table 3 and Figure 4 show the mean score differences between the pretest and posttest after the intervention. Learners in suburban have shown a positive increment of 2.66 mean scores (26%), in the meantime, learners in the urban area showed a definite increase of 1.83 mean scores (18%). Learners in suburban showed greater improvement compared to learners in urban. Results of the study prove that the first two levels of thinking skills which are remembering and understanding, as stated in Bloom's taxonomy, are further enhanced among learners after the intervention. 'Gamifographics'

managed to strengthen the pupils' newly acquired vocabulary, ultimately supporting learners to retrieve the meanings of the words from their memory and therefore they scored better in the posttest. This indicates that 'Gamifographics' has proved to be an effective tool in vocabulary learning.

This study confirms the results of Wu and Kuwajima (2022) who investigated the effects of infographics on enhancing language learning outcomes. The usage of infographics has aided in the recall of the key grammatical principles and encouraged the long-term learning gains that were observed in the study. Supported by Meatty's study (2020), infographics were effective in teaching grammar items. Using infographics in teaching grammar items lead to better comprehension and thus pupils' post-grammar achievement test results were much higher than their pre-test results. Not only that, Meatty's study revealed that the experimental group surpassed the control group. According to Khan (2021), infographics are helpful for pupils in understanding the subject by creating visual impact. Hameed & Jabeen's study (2022) also verified that infographics aid individuals in organising ideas as word and graphics combination really stimulates their cognition, particularly in the pre-writing stage. During Hameed & Jabeen's study (2022) study, it was also found that infographics greatly benefited learners' vocabulary and expression growth. The provided materials allowed the students to learn, recall, and use the pertinent vocabulary. The essays that were created for the post-test attempts used word choices that were both suitable and effective. From these, it was evident that infographics are the potential in helping pupils to advance their cognitive skills from lower-order thinking skills (remembering and understanding) to higher-order thinking skills. In general, 'Gamifographics' has proved to be an effective learning tool in vocabulary learning.

5.2 Gamifographics and Motivation

Furthermore, the findings of this research indicate that teaching vocabulary in the form of 'Gamifographics' has a positive impact on their motivation. This is because it includes simple and appealing visual texts helped them to grasp the meaning with more ease. The result was consistent with a study done by Lam and Phuong (2021) who indicated that reading infographics could help learners absorb English texts more easily as they combined words and images to deliver complicated information quickly and effectively. Besides, they also stated that an infographic was seen as a tool that motivates and encourages learners to learn. Based on the current research, the results of the questionnaire showed that the learners' motivation to learn vocabulary in English had increased greatly after the intervention. Based on the interview, learners found using 'Gamifographics' to be fun, useful, inspiring, interesting and informative. These imply that 'Gamifographics' is able to arouse pupils' learning interest which eventually promotes intrinsic motivation to learn. According to Self-Determination Theory, (Deci & Ryan, 1985), the tendency to be interested in new things and to actively learn are important parts of human nature which are crucial for cognitive development. This is because one's interests build knowledge and abilities. Moreover, quizzes in 'Gamifographics' that allow learners to assess their own understanding contain game elements that can also change pupils' learning attitudes by motivating them extrinsically. By giving immediate feedback and affirmation, pupils are highly motivated which can lead them to continuously stay engaged in learning and completing tasks. This type of motivation is the external regulation in extrinsic motivation which refers to behaviours that are motivated by externally imposed rewards. Thus, as a result of its ability to stimulate pupils' interests and its capacity to encourage and motivate them by imposed immediate affirmation, the teaching method known as 'Gamifographics' is said to be able to enhance pupils' academic performance specifically in vocabulary learning.

6. CONCLUSION

Malaysian students in the twenty-first-century classroom favour infographics as visual media channels. It is believed that an infographic inspires and encourages students to learn. Meanwhile, it is inevitable to use gamified learning to help students learn a second language as researchers have found

that incorporating game elements or game mechanics into language learning can boost students' interest, memory, and ultimately their learning outcomes. Therefore, this research combines these two approaches to create a novel intervention called 'Gamifographics' for teaching vocabulary to primary school pupils. In general, the results showed that 'Gamifographics' are well-liked for vocabulary development since they are appealing visually, simple to comprehend and retain and maintain the readers' interest throughout the learning process. Arousing the pupils' interest in learning can boost their innate motivation to learn. This is significant since one's interests can enhance their knowledge and skills. Furthermore, quick quizzes in 'Gamifographics' not only enable pupils to test their own understanding, but it also has game elements that can alter pupils' learning attitudes by motivating them extrinsically. As a result, 'Gamifographics' should be considered as a tool for teaching vocabulary to primary school pupils of English. It is also recommended that 'Gamifographics' be used in elementary or secondary schools as part of future research to evaluate their efficacy in learning.

References

Adwani, P., & Shrivastava, S. (2019). Analysis of factors affecting second language acquisition. *International Journal of Social Sciences and Management*, *4*(3),

Alahmah, M. (2020). Strengths and Weaknesses of Cognitive Theory. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*, Volume 3, No 3, August 2020, 1584-1593

Alrwele, N. S. (2017). Effects of Infographics on Student Achievement and Students' Perceptions of the Impacts of Infographics. Journal of Education and Human Development, 6(3), 104-117.

Behling, O., & Law, K. S. (2000). Translating questionnaires and other research instruments: Problems and solutions. Thousand Oaks, CA: Sage.

Bloom, B., Englehart, M., Furst, E., Hill, W., & Krathwohl, D. (1956). Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook I: Cognitive domain. New York: Longman.158-164

Branch, R. M. (2009). *Instructional design: The ADDIE approach* (Vol. 722). Springer Science & Business Media.

Bunchball, I. (2010). Gamification 101: An introduction to the use of game dynamics to influence behavior. *White paper*, 9, 1-18.

Bystrova, T. (2020). Infographics As a Tool for Improving Effectiveness of Education. *KnE Social Sciences*, *4*(13), 152–158. https://doi.org/10.18502/kss.v4i13.7710

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum.

Dipa, P. S., Utami, I. G. A. L. P., & Santosa, M. H. (2022). English Learning Using Infographics for Balinese Secondary School Students. *PANYONARA: Journal of English Education*, *4*(1), 1-16.

Gardner, R. C., & Lambert, W. E. (1959). Motivational variables in second-language acquisition. *Canadian Journal of Psychology/Revue canadienne de psychologie*, *13*(4), 266.

Hameed, A., & Jabeen, I. (2022). Prompting cognition for creativity in EFL context: An experimental study on use of infographics for teaching writing skill. *Journal of Language and Linguistic Studies*, *18*(1), 724-737.

Hashim, H., Rafiqah, R. M., & Md Yunus, M. (2019). Improving ESL learners' grammar with gamified-learning. *Arab World English Journal (AWEJ) Special Issue on CALL*,(5), 41-50. https://doi.org/10.24093/awej/call5.4

Khan, I. A. (2021). Psychology of Color, Integration of Local Culture and Effect of Infographics on English Language Learning. *PSU Research Review*.

Krathwohl, D. R. (2002). A Revision of Bloom's Taxonomy: An overview. Theory into Practice, 41(4), 212-219 .

Korniush, H. (2020). Theoretical evaluation of the potential of infographics as powerful tools in English language teaching. *Problems of Engineer-Pedagogical Education*, (65), 147-155.

Lam, K. N., & Phuong, H. Y. (2021). THE IMPACT OF USING INFOGRAPHICS TO TEACH GRAMMAR ON EFL STUDENTS'LEARNING MOTIVATION. *European Journal of Foreign Language Teaching*, *5*(5).

Le, L.T. (2021). A real game-changer in ESL classroom? Boosting Vietnamese learner engagement with gamification. *Computer-Assisted Language Learning Electronic Journal*, *21*(3), 198-212.

Lo, Y. Y., & Aziz, A. A. Rescue Yonna: Game-based Learning in Enhancing Secondary 4 Students' English Vocabulary. *Business Studies and Education (ICBE) 02nd–03rd July 2022*.

Lukas, B. A., Patrick, F. I. A., Chong, G., Jaino, N. B., & Yunus, M. M. (2020). Using U-NO-ME Card Game to Enhance Primary One Pupils' Vocabulary. *International Journal of Learning, Teaching and Educational Research*, *19*(5), 304-317.

Manzano-León, A., Camacho-Lazarraga, P., Guerrero, M. A., Guerrero-Puerta, L., Aguilar-Parra, J. M., Trigueros, R., & Alias, A. (2021). Between level up and game over: A systematic literature review of gamification in education. *Sustainability, 13*(4), 2247.

Meatty, A. A. (2020). The Impact of Using Infograohics on Improving Grammar Learning for Primary Stage Pupils and Their Attitude Towards It. *Journal of The Faculty of Education - Mansoura University*, (111), 220-255.

Menik, K. S., & Yuhendri, L. (2016). Analysis characteristics of learning styles VAK (Visual, Auditory, Kinesthetic) student of Banks and Financial Institutions course. International Conference on Education for Economics, Business, and Finance, 2002, 437–446.

Nhan, L. K., & Yen, P. H. (2021). The Impact of Using Infographics to Teach Grammar on EFL Students' Learning Motivation. *European Journal of Foreign Language Teaching*, *5*(5).

Ozdamli, F. & Ozdal, H. (2018). Developing an instructional design for the design of infographics and the evaluation of infographic usage in teaching based on teacher and student opinions. *EURASIA Journal of Mathematics, Science and Technology Education*, 14(4), pp. 1197- 1219. https://doi.org/10.29333/ejmste/81868

Pyankova, A. D. (2020). Methodological Potential of Infographics in Teaching English to Young Learners. In *Urgent problems of modern society. Language, culture, and technology in the changing world* (pp. 295-302).

Qasrawi, R., & BeniAbdelrahman, A. (2020). The Higher and Lower-Order Thinking Skills (HOTS and LOTS) in Unlock English Textbooks (1st and 2nd Editions) Based on Bloom's Taxonomy: An Analysis Study. *International Online Journal of Education and Teaching*, *7*(3), 744-758.

Richey, R.C. & Klein, J.D. (2007). Design and development research. New Jersey, USA : Lawrence Erlbaum Associates, Inc.

Stratton, S. J. (2021). Population research: convenience sampling strategies. *Prehospital and disaster Medicine*, *36*(4), 373-374. https://doi.org/10.1017/s1049023x21000649

Sulistyowati, T. (2019). Bottom-up and top-down listening processes within cognitive constructivist learning theory. *PROMINENT Journal*, *2*(1), 92-100.

Wu, M., & Kuwajima, K. (2022). The Effects of Infographics on Enhancing Language Learning Outcomes and Motivation in a Japanese EFL Context. *European Journal of Foreign Language Teaching*, *6*(4).

Yaccob, N. S., & Yunus, M. M. (2019). Students' Perspectives On Challenges And Solutions To Learning English In Malaysian Esl Context. *Journal of Language and Communication (JLC)*, 487-496.

Yee, C. H., & Ganapathy, M. (2017). To Investigate ESL Students' Instrumental and Integrative Motivation towards English Language Learning in a Chinese School in Penang: Case Study. *English Language Teaching*, *10*(9), 17-35.