Gamification and Vocabulary Teaching: Insights from a Systematic Review

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Gamification and Vocabulary Teaching: Insights from a Systematic Review

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Abstract

Vocabulary is another domain in which teachers seek support regarding instructional methods, strategies, and resources as it is still unclear which method is more efficient in vocabulary instruction because it is affected by a number of variables and coursebooks and curricula do not direct neither the teachers nor the students properly. How teachers can effectively integrate technology into vocabulary instruction remains less certain despite the extensive presence of digital technologies in all areas including education. One effective method is gamification that is defined as integrating the elements of the game into the process in order to promote the realization of targeted behaviors. It is suggested in the literature that gamification not only enhances learners' motivation but also facilitates the implementation of a better educational plan as it increases both quality and the element of fun in learning. Based on Self-determination and Flow theories theoretically and following PRISMA framework for data collection, analysis, and interpretation; this study provides a comprehensive picture of how the implementation of digital gamification in vocabulary teaching impacts the learning process through in-depth analysis.

Introduction

Learning vocabulary is a significant part of language acquisition whether it is the mother tongue or the second or foreign language that is being acquired as having sufficient amount of vocabulary is crucial and necessary to be able to communicate effectively in the target language (Coady & Huckin, 1997). Moreover, studies confirm high correlation (0.6 to 0.8) between vocabulary knowledge and reading comprehension (Baumann & Kame'enui, 2004; Pearson et al., 2007). To comprehend what a text entails, the words that represent the ideas or concepts must be understood.

How teachers can effectively integrate technology into vocabulary instruction remains less certain despite the extensive presence of digital technologies in all areas of our era including education. Vocabulary is another domain in which teachers seek support regarding instructional methods, strategies, and resources (Berne & Blachowicz, 2008) as it is still unclear which method is more efficient in vocabulary instruction because it is affected by a number of variables and coursebooks and curricula do not direct neither the teachers nor the students properly (de Groot, 2006; Schmitt, 2008).

When the literature on vocabulary learning is examined, it is seen that vocabulary learning strategies are

categorized into two as cognitive and metacognitive by Gu (2018). Metacognitive strategies emphasize learning vocabulary through using them in contexts. In this process, it is important that learners take initiative and that there are contents motivating selective perception. On the other hand, cognitive strategies emphasize the steps of first exposure to the word, ensuring its retainment, and using it actively. Techniques such as making inferences and using dictionaries are included during the first exposure to the word, while verbal and visual repetition of the word and coding the word visually, auditorily, and contextually are necessary in the retention phase. Finally, the strategy of using the acquired words actively in a natural process follows. In summary, vocabulary learning requires that the learner is involved, that it is supported by tangible materials, and that acquired words are actively used. When these aspects of vocabulary acquisition are taken into consideration, it is clear that using games in vocabulary teaching is valuable.

Games are significant tools for children to acquire new knowledge, to form and expand skills, and to integrate their thoughts with actions (Piaget, 2010). One of the most crucial benefits of such an important tool in the learning process is that children do not experience anxiety during the game, that they maintain high levels of motivation, and that they have the opportunity for authentic communication (Mubaslat, 2012). These characteristics of the game are consistent with the vocabulary learning strategies suggested by Gu (2018) as children are exposed to new words in natural and highly motivated environments and have the chance of using them naturally without experiencing academic pressure. Therefore, incorporating games in educational settings would facilitate their learning.

One effective method is gamification. Gamification is defined as integrating the elements of the game (mechanics, dynamics, and incentives) into the process in order to promote the realization of targeted behaviors (Lee & Hammer, 2011). Thus, it can be stated that the learner would be highly motivated during the process while staying connected to the essence of education. Moreover, it is suggested in the literature that gamification not only enhances learners' motivation but also facilitates the implementation of a better educational plan as it increases both quality and the element of fun in learning (Deterding et al., 2011; Kapp, 2012; Landers & Armstrong, 2017). This study aims to provide a comprehensive picture of how the implementation of digital gamification in vocabulary teaching impacts the process which is a fundamental aspect of language teaching through in-depth analysis.

Theoretical Framework

Although gamification was first used to modify electronic interfaces to make them more engaging, it has then been defined in terms of the role its elements play (Pelling, 2011). Gamification can generally be defined as the integration of game's mechanics, elements, and design into an outside environment or context (Alsawaier, 2018; Deterding et al., 2011; Lee & Hammer, 2011; Werbach & Hunter, 2012). Based on this definition, it can be stated that the major objective of gamification is not to entertain individuals by having them play the game but rather to produce behavioral change by incorporating elements, mechanics, and the like into the system. As it is aimed to increase the motivation of individuals in gamification, it can be utilized both for shaping behaviors and for overcoming potential problems (Zicherman & Cunningham, 2011). Thus, the concept of motivation, which is a

significant variable in education, is also crucial for gamification.

It is asserted that psychological needs should be considered in order to understand human motivation thoroughly and this is explained by the Self-determination Theory that forms the basis of gamification (Deci & Ryan, 2000). Which factors are effective in the healthy realization of individuals' or societies' development is emphasized in the Self-determination Theory (Ryan & Deci, 2000). According to this theory, in addition to individuals' innate characteristics, environmental factors such as the ability to make choices and fulfilling basic psychological needs may also be significant (Deci, Ryan, Gagne, Lronr, Usunov & Kornazheva, 2001; Williams, Frankel, Campbell & Deci, 2000).

The aforementioned factors impact motivation in relation to autonomy, competence, and relatedness and these are structured according to the game elements (Aparicio, Vela, Sanchez & Montes, 2012). Autonomy refers to the player's ability to make decisions, to choose freely, and to participate voluntarily in the process; competence pertains to player's feeling capable and being able to control their emotions; and relatedness is defined as player's need for socialization and its facilitation as a result (Ersoy, 2017; Şahin & Samur, 2017). Another primary theory that gamification is based upon is the Flow Theory. Proposed by Csikszentmihalyi (1991), the Flow Theory is related to extending the focus of the player during the process. If the tasks within the game are significantly below the player's level, s/he may get bored; if the tasks are far beyond the player's level, s/he may be discouraged to complete them (Dominguez, et al., 2013). Applying gamification in line with the Flow Theory is crucial to enhance students' motivation and keep them active throughout the process.

Moreover, the other foundational approach underlying gamification is the Fogg Behavior Model (FBM onwards). According to the FBM, behavior occurs if motivation, trigger, and skill are present at the same time (Fogg, 2019). This model suggests that it would be easier to achieve the desired behavior when motivation and skill increase. Triggers for behavior come into play at this point. To illustrate, a person is motivated to cook because s/he is hungry, and s/he also possesses the ability to cook. However, a trigger is required to prompt the person to act immediately. If this trigger is not present at the same time with others (motivation and skill), behavior will not occur.

Similarly, it is sufficient to remove one of the three components (motivation, trigger, and skill) to extinguish a behavior (Fogg, 2019). Thus, desired behavioral change in students can be achieved if these three variables are taken into consideration when the content in gamification is structured. From this point, it is important to study game elements and how they are classified to employ gamification.

There are various studies in the literature on game elements and how these elements are classified. The first is Werbach Pyramid and D6 Model proposed by Werbach and Hunter (2012). Werbach Pyramid (see Figure 1) categorizes game elements from bottom to top as "components, mechanics, and dynamics". Dynamics are composed of games' fictional elements (such as constraints and storytelling), mechanics refer to the motivation-based elements (such as rewards, winning conditions, and turns), and components consist of the most pronounced part of the game design (such as tasks, points, and levels).

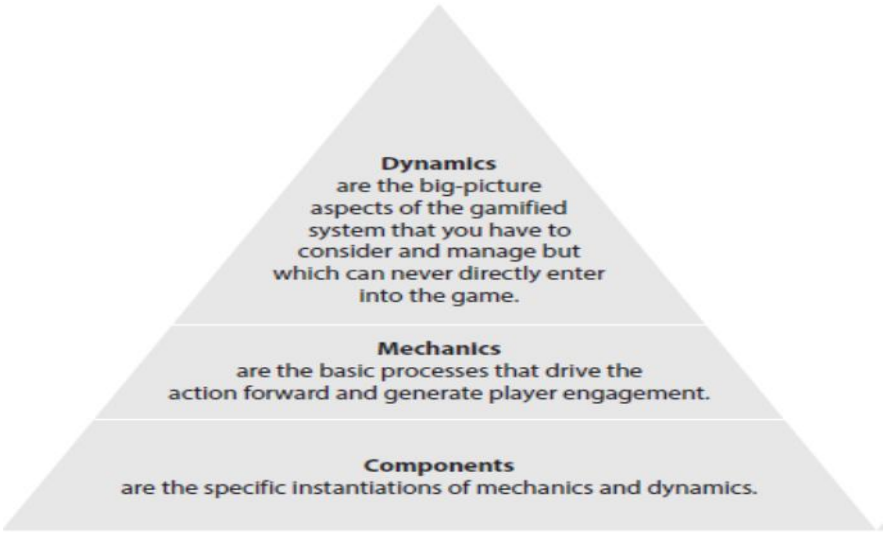

Figure 1. The Game Element Hierarchy (Werbach and Hunter, 2012, p. 71.)

In the design process, Werbach and Hunter (2012) propose that gamification should be designed in six steps (see Figure 2), all starting with the letter "D". The first two steps involve defining goals and targeted behaviors. The third and fourth steps require determining player types and designing the activity loop. The last two steps include selecting elements of fun and determining appropriate tools.

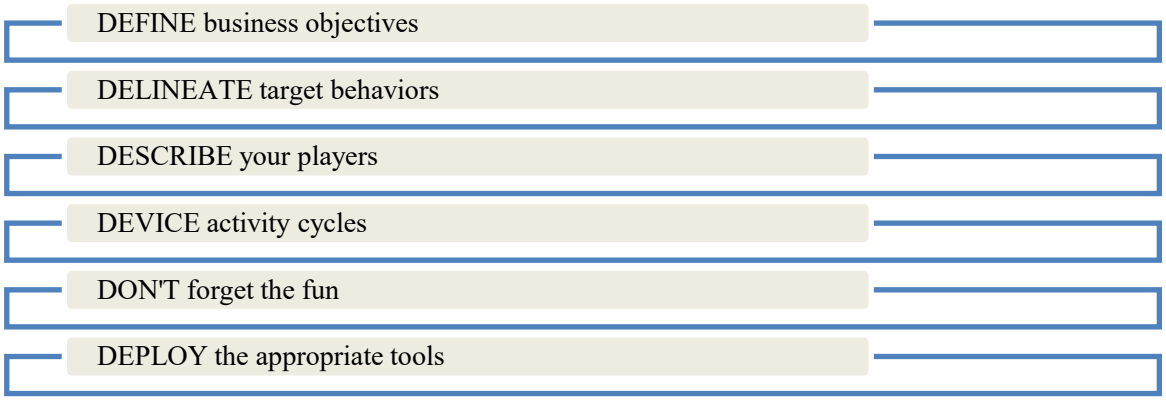

Figure 2. D6 Model (Werbach and Hunter, 2012, p. 74.)

On the other hand, Chou (2019) explains game elements within the Octalysis framework under eight headings (see Figure 3). The Octalysis framework essentially is divided into four parts. The elements on the right side under the heading of social influence are aimed at social and emotional skills, while the elements on the left side under the heading of ownership target logical skills. Moreover, Chou (2019) divides the Octalysis model into two as lower and upper sections. The elements in the upper section, that are achievement, meaning attribution, and authority, are regarded as positive motivation factors and the elements in the lower section, that are scarcity, avoidance, and unpredictability, are considered as negative motivation factors.

Initially emerging within the business sector, gamification has found its place within education as well. Gamification offers several benefits such as enhancing students' motivation and supporting learning (Gökkaya,

2014; Kapp, 2012). In addition, it has the potential of both generating a desire in children towards learning and boosting this desire with need, curiosity, and enjoyment (Tılıç, 2020). In fact, fostering a desire in children for learning and supporting this desire with emotions in educational contexts are significant for the realization and retention of learning. On the other hand, there are important benefits of gamification for vocabulary teaching. It is necessary to provide quality input and output in language teaching; that is, active use of the language is required. Therefore, gamification encourages children to communicate with others. Children have the opportunity to use their language skills actively and to expand their vocabulary during gamification. Moreover, language learners are eager to try new approaches as they find the process of vocabulary learning tedious, as serious concentration is required on the nuances of word meaning, and as retention is limited because of rote memorization (Nation, 2001). Gamification can encourage learners to use the language by transforming this tiresome process into an enjoyable one. Students can also benefit from retention as they use the words actively.

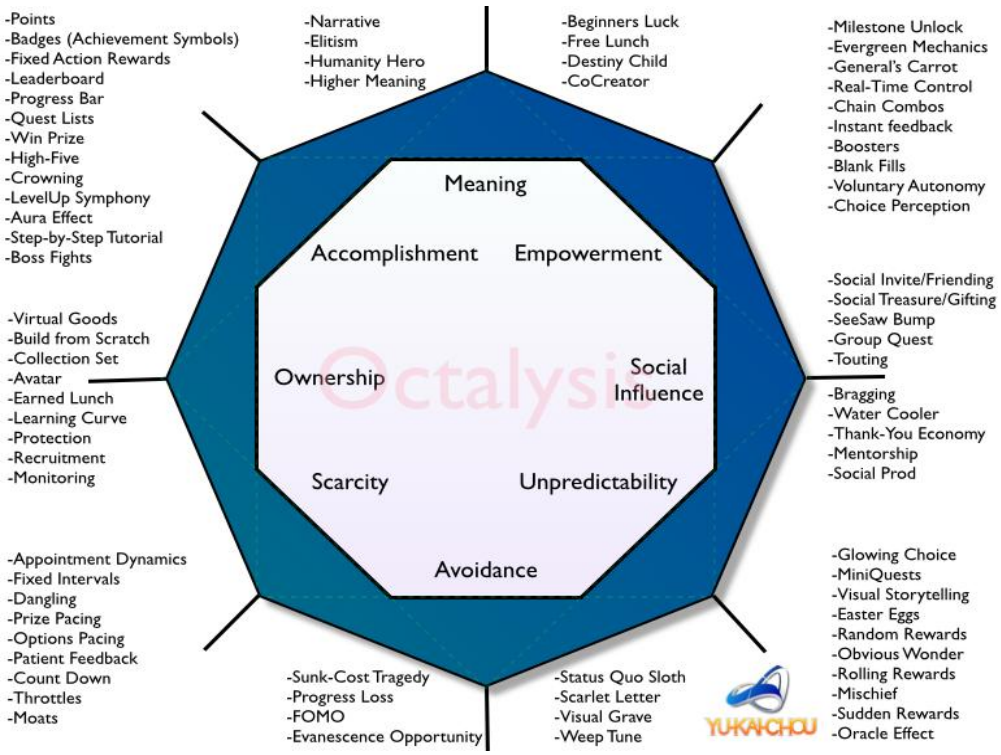

Figure 3. The Octalysis Framework (Chou, 2019, p.23)

This review study aims at providing context and background for the studies included and examining how digital gamification is utilized in vocabulary teaching. Within this context, the following research questions are addressed:

1. What are the characteristics of the participants (e.g., education levels, sample size) in the studies included?
2. How was vocabulary knowledge measured in the studies included?
3. Which target languages were identified in the studies included?
4. Which digital tools were used in the studies included?
5. What features of learning through gamification were explored in the studies included?

Vocabulary Instruction through Digital Gamification

There have been four major meta-analytic studies on vocabulary instruction through digital gamification. The first one was conducted by Chiu, Kao, and Reynolds (2012) for which 12 studies on digital gamification on vocabulary instruction were analyzed. The results of the study revealed that drills and practice games produced a small effect size resulted in limited learning while digital games yielded a large effect size. It was asserted that meaningful and engaging digital games elicited more learning as they provide more interaction.

The second study was carried out by Chen, Tseng, and Hsiao (2018) where they analyzed 10 studies. The results of the study indicated that the game design was the only significant mediator that could explain the effects of digital gamification on vocabulary instruction. It was suggested that the element of challenge should gradually increase, and adventure games should be placed above non-adventure games.

The third study was conducted by Tsai and Tsai (2018) for which 26 empirical studies in second language contexts were analyzed. Experimental and control groups in the study compared (1) video games and non-game-related activities, (2) video games with base versions and with specific features added, and (3) playing a digital game and learning via conventional media. The results of Tsai and Tsai's (2018) research provides convincing support for the use of digital games in vocabulary instruction.

The last study was performed by Zhou, Huang, and Zie (2021). 21 publications in SSCI journals were reviewed from five perspectives: a general overview of published studies, digital games for vocabulary learning, theoretical frameworks, research issues and findings, and implications. The results of the study indicated that "(1) digital games promote effective vocabulary learning; (2) interactions in game environments are conducive to vocabulary learning; (3) game-embedded multimedia facilitates vocabulary learning; and (4) over-specified vocabulary information is better than isolated or minimally specified information" (p. 772).

As seen, there has been an increasing interest in the research area of vocabulary instruction through digital gamification. However, the total number of studies are still limited to frame a theory or suggest practical implications. Subdivide text into unnumbered sections, using short, meaningful sub-headings. Please do not use numbered headings. Please limit heading use to three levels. Please use 12-point bold for first-level headings, 10-point bold for second-level headings, and 10-point italics for third -level headings with an initial capital letter for any proper nouns. Leave one blank line (1.5 times spaced) before and after each heading. (Exception: no blank line between consecutive headings.) Please margin all headings to the left.

Method

This systematic review that examines the effects of gamification on language learning is shaped based on the PRISMA framework developed by Page et al (2021). This framework is a simple and clear guide both for systematic review and meta-analysis studies. Presenting and summarizing the characteristics of systematic review studies helps policy makers and practitioners to better assess the relevant area of research (Page et al., 2021).

Since this systematic-review research reveals the effects of digital gamification on vocabulary teaching, it is thought that it will be a tool for policymakers and practitioners in this field to evaluate the relevant issue.

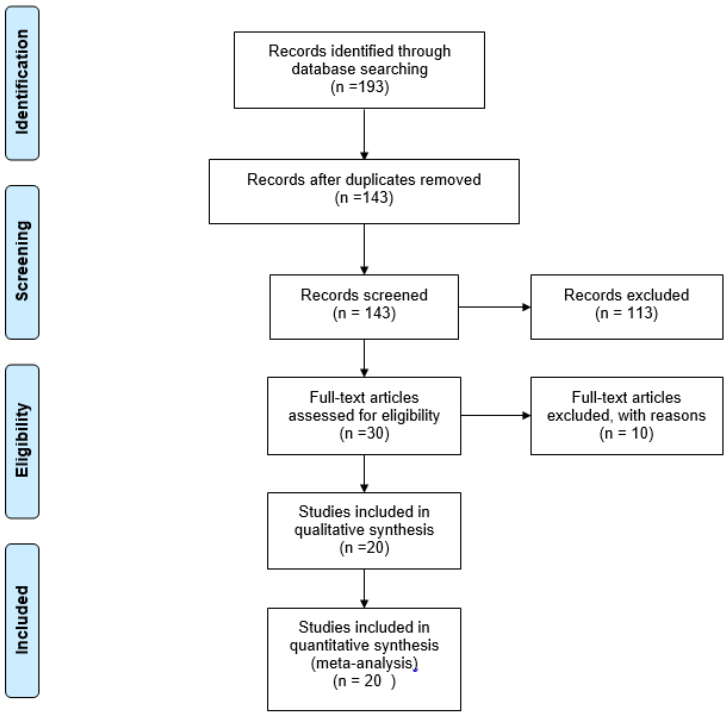

Figure 4. PRISMA 2020 Flow Diagram

Selecting Studies

To determine the studies to be included in this review, key words such as "gamification", "word", "vocabulary", and "vocabulary teaching" were searched on Web of Science Core Collection (WOSCC), Turkish Council of Higher Education Thesis Center, ProQuest, and Google Scholar databases. 193 studies were located in total. These studies were eliminated according to the following criteria:

- Full-text studies only in English or Turkish
- Studies aiming at developing vocabulary
- Studies using digital gamification

Based on the criteria, 143 studies were identified as studies focusing on other language skills (such as reading and writing), not related to vocabulary instruction. 30 more studies were not included as 20 studies were not based on an application, 9 did not include any digital component, and 1 was solely a review on motivation and attitude. As a result, this study includes 20 studies that met the criteria.

Data Analysis

This section describes the methods according to which the research was synthesized as described in PRISMA. The first step in data analysis was codification. Literature was reviewed and then research questions were

generated. Next, a table on the studies included was produced based on the research questions. The table was double-checked, and its accuracy was confirmed after a thorough reading of the studies included. Next, the participants in the studies included were analyzed according to their characteristics (e.g., education levels, sample size). Then, approaches of vocabulary assessment, which languages are targeted, learning approaches, and related theories are explored. While classifying the methods of vocabulary assessment, studies that applied word matching and multiple-choice techniques were defined as receptive and studies that used sentence formation and translation techniques were identified as productive as proposed by Hao et al (2021). Finally, studies included were analyzed in terms of the features of learning through gamification by grounding the analysis on the classification of Bedwell et al (2012) according to which there are nine characteristics of learning through gamification: action language, assessment, conflict/challenge, control, environment, game fiction, human interaction, immersion, and rules/goals.

Results

The findings obtained from this systematic review that explore the effects of digital gamification on vocabulary instruction are presented in subsections based on the research questions.

General Overview of the Studies Involved in the Review

It is determined that participants of the studies that examine the effects of digital gamification on vocabulary instruction consist of primary, secondary, high school, and college students. Figure 5 shows the distribution of the participant groups.

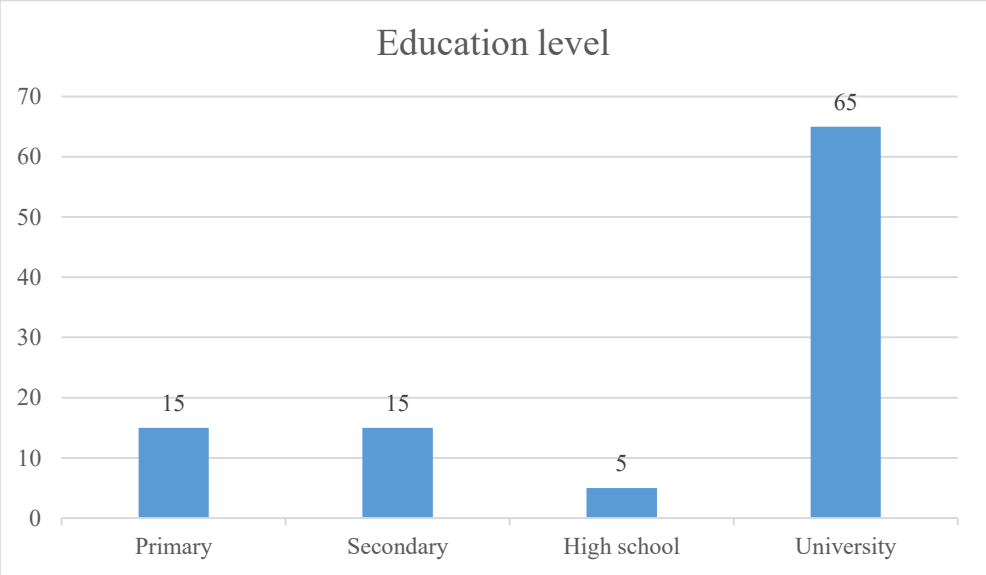

Figure 5. Participants' Education Levels

It is revealed that the effect of digital gamification on vocabulary instruction has been applied across all educational levels with the exception of pre-school children. The majority of studies have been conducted at the

undergraduate level focusing on teaching English. On the other hand, an equal number of studies have been carried out at primary and secondary school levels. The fewest research has been conducted at the high school level. When the number of participants is considered, it is determined that there are only 3 studies (Al-Hoorie & Albijadi, 2024; Panmei & Waluyo, 2023; Waluyo & Tran, 2023) that have a hundred or more participants included. It is also verified that there are 9 studies that include 50-99 participants and 8 studies that include up to 49 participants. The studies included in this review are categorized according to their research type as shown in Figure 6.

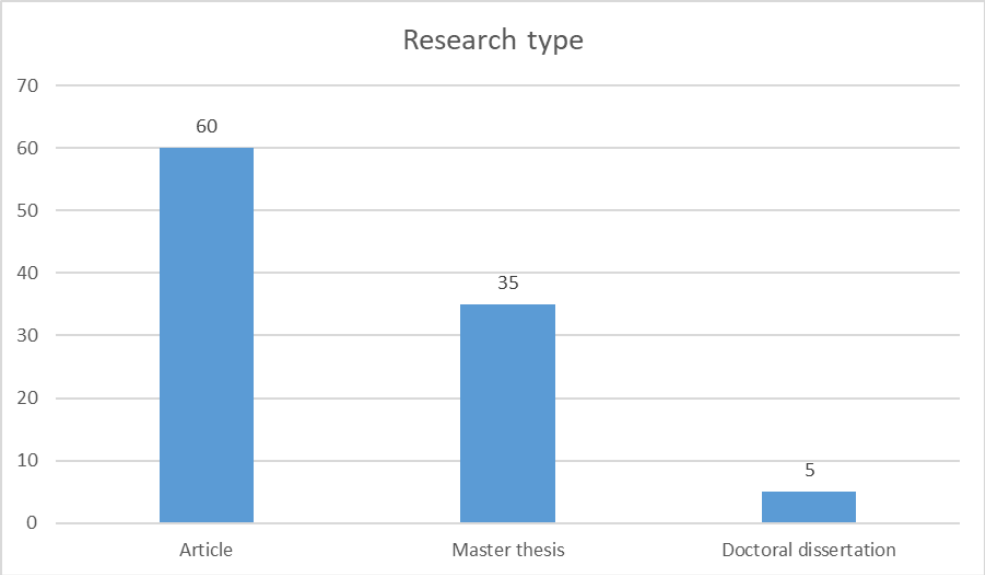

Figure 6. Research Types of the Studies included

As seen in the figure, most of the studies are scholarly articles. Following these, unpublished master's theses rank second. There is only one doctoral dissertation written by Doğan (2023).

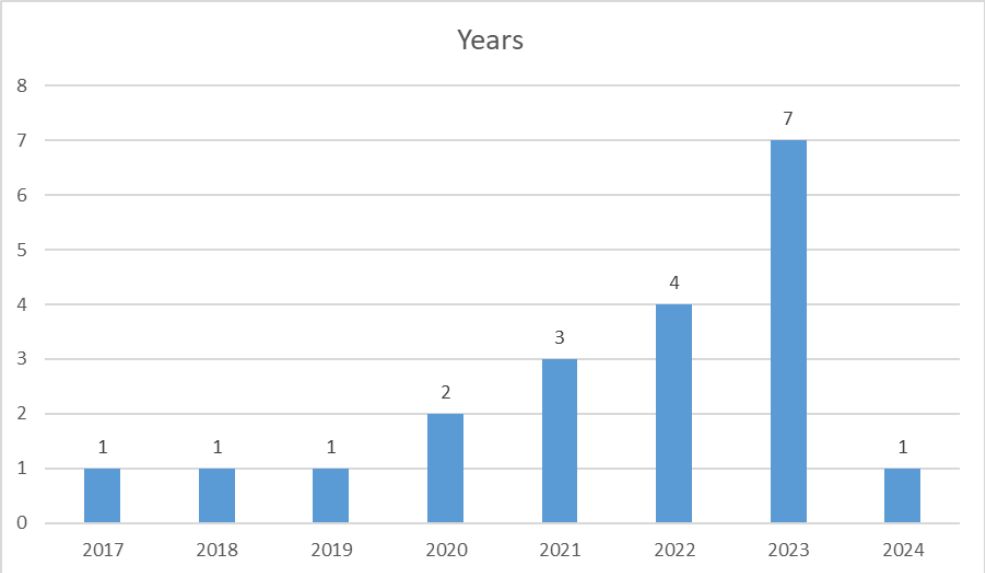

Figure 7. Distribution of Studies over the Years

It is evident that studies exploring the impact of digital gamification on vocabulary instruction have been steadily

increasing over the past seven years. There was a significant increase in 2023 with 7 studies. However, as this review is conducted in 2024, only one study has been identified from this year.

Findings on Target Language Instruction

The languages targeted in the studies included in this review are shown in Figure 8.

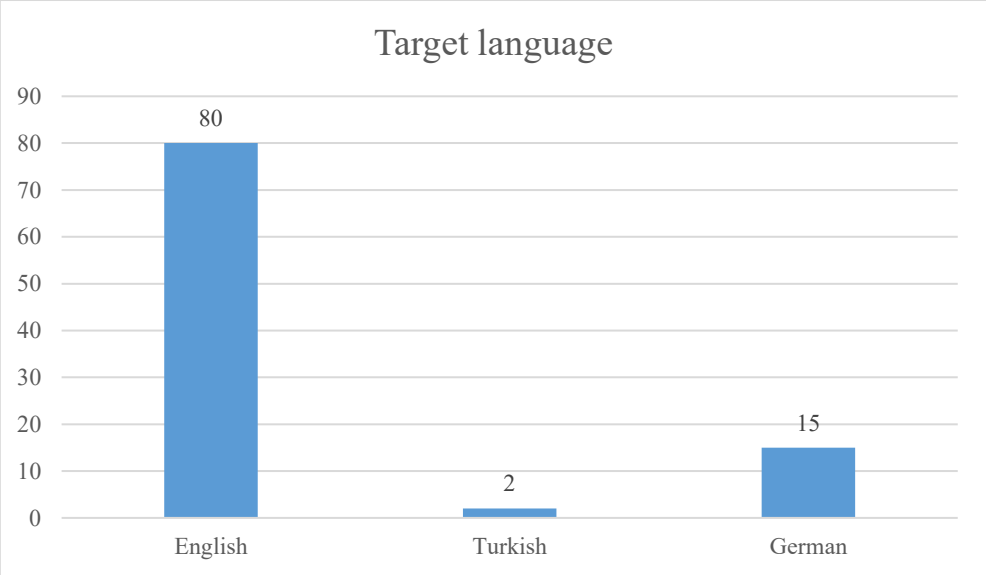

Figure 8. Target Languages

It is determined that that the majority of the studies (80%) focused on English as the target language while German (15%) and Turkish (5%) were also addressed. It is noteworthy that Turkish was targeted as a native language whereas English and German as a foreign language.

Determining Vocabulary Knowledge

When examining the impact of digital gamification on vocabulary instruction, it is revealed that multiple-choice tests are commonly used as data collection instruments. In this context, it is determined that the majority of the studies (n=17) utilized tools that aim at generating receptive language. Moreover, tools that target productive language skills are used only in two studies. Though, there is one study that utilized tools measuring both receptive and productive language skills. Table 1 presents the tools that are employed in the studies.

Table 1. Tools to measure Vocabulary Knowledge

Tool	Studies
Multiple-choice test	Al-Hoorie & Albijadi (2024); Aykut (2022); Dindar, Ren & Järvenoja (2021); Doğan (2023); Ertürk (2023); Genç Ersoy & Belet Boyacı (2021);

Tool	Studies
	Gündoğan (2023); Karsli (2022); Kayseroglu & Samur (2018); Kazazoğlu (2023); Liu et al (2022); Panmei & Waluyo (2023); Retherford (2020); Waluyo & Bucol (2021); Waluyo & Tran (2023); Yu (2023)
Fill-in the blanks	Genç Ersoy ve Belet Boyacı (2021)
Sentence formation	Genç Ersoy ve Belet Boyacı (2021); Türkmen (2022); Vijayakumar (2020)
Matching	Karatekin (2017); Uyar (2019)

It is observed that multiple-choice tools are the most preferred tools to measure vocabulary knowledge than others. However, Genç Ersoy and Belet Boyacı (2021) employed multiple techniques within a single tool.

Digital Tools Utilized

Digital tools that are employed in the studies included for digital gamification are given in Figure 9.

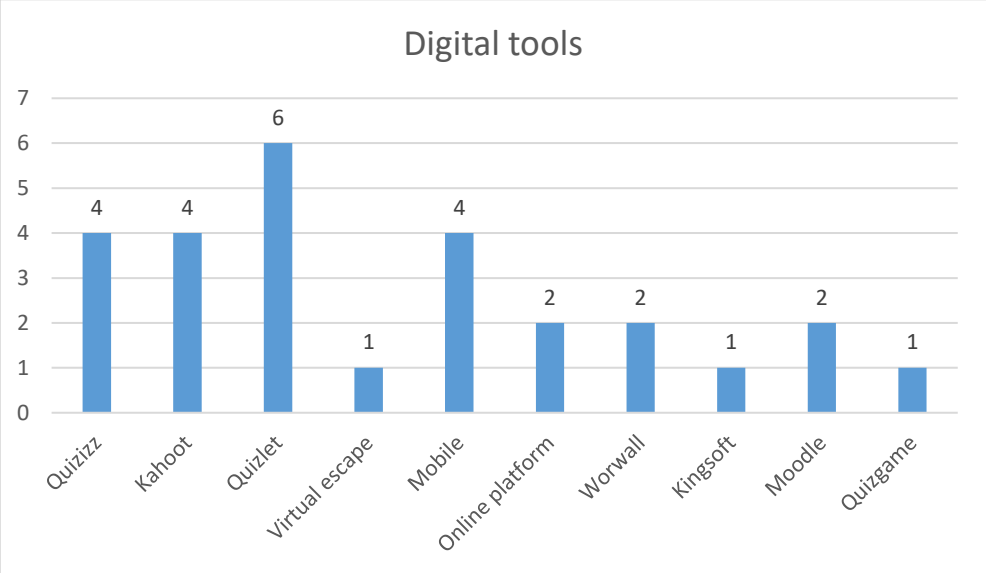

Figure 9. Digital Tools utilized

The most preferred tool, as seen in Figure 9, is Quizlet. Quizizz, Kahoot, and mobile applications are also commonly used. Moreover, there are studies that employed only one tool (e.g., Vijayakumar, 2020; Yu, 2023) as well as studies that utilized more than one (e.g., Gündoğan, 2023; Uyar, 2019).

Features of Learning through Gamification

When analyzing the studies included in this review based on the features outlined by Beldwell et al (2012), assessment appears as the most prominent feature (n=14). This finding can be explained by the fact that tools tracking student's success and progress, such as Quizlet and Kahoot, are used. On the other hand, studies that integrated gamification into Moodle (Doğan, 2023; Vijayakumar, 2020) emphasize human interaction as they provide a structure enabling greater student interaction during the gamification process. The feature of game fiction is highlighted in the studies that incorporated fiction and scene into gamification (Al-Hoorie & Albijadi, 2024; Aykut, 2022; Genç Ersoy & Belet Boyacı, 2021).

Discussion and Implications

This study systematically reviews 20 academic research investigating the effects of digital gamification on vocabulary instruction. A general overview of the studies reveals that digital gamification in the context of vocabulary instruction has been studied for the past seven years with a significant increase in recent years. The majority of the studies are journal articles followed by master's theses. Most of the studies were conducted at the undergraduate level. However, in contrast, other systematic reviews on vocabulary instruction have determined that more studies are carried out at the primary school level (Haoming & Wei, 2024; Zhou et al., 2024).

When the languages targeted in these studies were examined, English as a foreign language appears to be the primary focus. Moreover, another striking finding is that there is only one study that was conducted on native language instruction. It was found out that multiple-choice tests were used more frequently than fill-in the blanks or sentence formation methods. Indeed, systematic reviews on vocabulary instruction reveal that multiple-choice tests are preferred to measure vocabulary knowledge (e.g., Haoming & Wei, 2024; Zhou et al, 2024). Therefore, it can be asserted that the majority of the studies were structured according to the assessment of receptive language skills. In their meta-analysis on technology-supported vocabulary instruction in a second language, Hao et al (2021) claims that it is fundamental to use both receptive and productive language assessment techniques for a more thorough determination of vocabulary knowledge.

Regarding the digital tools employed, it is determined that tools, such as Quizlet, Quizizz, and Kahoot, that enable the participants track their own success during the gamification process and that are suitable for measuring their vocabulary knowledge through multiple-choice tests were chosen. The studies included in this review provided different reasons for selecting these tools. For instance, Panmei and Waluyo (2023) stated that they preferred Quizizz as it has not been widely used in vocabulary instruction, thereby filling a gap in the field. Explicitly used for the purposes of vocabulary teaching, Quizlet was chosen as it can be accessed both on computers and tablets and suitable for individual or team use (Liu et al, 2022).

On the other hand, it is notable that mobile tools are also used in digital gamification for vocabulary instruction as suggested by the studies included in this review. Mobile devices that can be accessed regardless of time or place are increasingly integrated in education (Kukulska-Hulme & Shield, 2008). Thus, it is inevitable to have

many different mobile applications and to combine those with gamification for vocabulary instruction. Moreover, in their systematic review on technology-supported vocabulary instruction, Zhou et al (2024) concluded that mobile tools are the most commonly used ones. Hao et al (2021) claimed in their meta-analysis that mobile tools are more effective in vocabulary acquisition than computer-based learning due to the personalization and non-spatial features of mobile tools. Thus, it is expected that digital tools will be integrated into education increasingly and will be more valuable for vocabulary instruction as they have been improving steadily and diminishing in size but growing in accessibility.

When the studies included in this review are analyzed based on the features of learning through gamification, it is concluded that assessment, human interaction, and game fiction are emphasized. Assessment is a significant component of games (Beldwell et al, 2012); therefore, features of digital gamification tools used in the studies that enable the learners to track their own progress and see their scores were frequently implemented. This is important to show the learners' performance and keep them engaged in the process. Another prominent feature is human interaction. Interaction in digital games supports technological tools to facilitate interpersonal activities (Prensky, 2001). The use of tools, such as Quizlet and Moodle, in the studies included in this review that support in-game interaction is a significant feature to highlight the feature of human interaction. Regarding the game fiction feature, it is found out that some studies stress fiction in the gamification process. For instance, Genç Ersoy and Belet Boyacı (2021) designed each topic as a planet and structured the players as astronauts.

Finally, in this review that assesses studies investigating the effects of digital gamification on vocabulary instruction, it is determined that most of the studies focus on receptive vocabulary knowledge and ignore productive vocabulary knowledge. This may be an indication of preferring metacognitive methods less during vocabulary learning and assessing vocabulary knowledge through gamification. Furthermore, focusing exclusively on receptive vocabulary knowledge weakens the comprehensiveness of the process. Additionally, most of the studies employed ready-to-use applications, with very few designing their own. This may be the reason why other languages were targeted less than English.

Based on these findings, it is suggested that assessment methods measuring both receptive and productive vocabulary knowledge be used, and gamification process be structured accordingly in future research that investigates the effects of digital gamification on vocabulary instruction. Lastly, researchers should develop their own design for the gamification process so that target language in the studies, either as a native language or second/foreign language, will be diversified.

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