

Token Economies in Digital Learning: A Critical Examination of Gamification's Impact on Vocabulary Acquisition and Student Engagement

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ABSTRACT: *This study examines gamification strategies centered on Skinner's operant conditioning theory and their impact on learning behavior and student engagement. This strategy focuses on rewards and punishments. Over the course of ten weeks, data were collected via a digital questionnaire distributed to 21 high school students. The questionnaire included open-ended questions to capture qualitative experiences, as well as 5-point Likert scale items to measure perceptions of gamification mechanics. Reflexive thematic analysis, which emphasizes iterative coding and researcher reflexivity, was used to interpret the stories and discover important themes that answer this research question. The main findings showed that while rewards significantly increased external motivation and persistence in completing tasks, technological stress and burnout were caused by technical barriers (such as slow networks and complicated interfaces) and poorly designed competitive elements (such as leaderboards). Students emphasized the importance of balanced gamification, prioritizing intuitive design, collaborative tasks, and consistency with learning objectives. To avoid over-justification, especially given the diverse needs of students, this research emphasizes the importance of combining intrinsic motivation with external rewards.*

Keywords: *gamification, token economy, vocabulary mastery, student engagement, technostress, thematic analysis, game-based learning.*

ABSTRAK: Studi ini meneliti strategi gamifikasi yang berpusat pada teori pengkondisian operan dari Skinner dan dampaknya terhadap perilaku belajar dan keterlibatan siswa. Strategi ini berfokus pada penghargaan dan hukuman. Selama sepuluh minggu, data dikumpulkan melalui kuesioner digital yang didistribusikan kepada 21 siswa sekolah menengah. Kuesioner tersebut mencakup pertanyaan terbuka untuk menangkap pengalaman kualitatif, serta item skala Likert 5 poin untuk mengukur persepsi tentang mekanisme gamifikasi. Analisis tematik refleksif, yang menekankan pengodean berulang dan refleksivitas peneliti, digunakan untuk menginterpretasikan cerita dan menemukan tema-tema penting yang menjawab pertanyaan penelitian ini. Temuan utama menunjukkan bahwa meskipun hadiah secara signifikan meningkatkan motivasi eksternal dan kegigihan dalam menyelesaikan tugas, stres dan kelelahan teknologi disebabkan oleh hambatan teknis (seperti jaringan yang lambat dan antarmuka yang rumit) dan elemen kompetitif yang dirancang dengan buruk (seperti papan peringkat). Para siswa menekankan pentingnya gamifikasi yang seimbang, memprioritaskan desain yang intuitif, tugas-tugas kolaboratif, dan konsistensi dengan tujuan pembelajaran. Untuk menghindari pemberanakan yang berlebihan, terutama mengingat kebutuhan

siswa yang beragam, penelitian ini menekankan pentingnya menggabungkan motivasi intrinsik dengan imbalan eksternal.

Kata Kunci: gamifikasi, token economy, penguasaan kosakata, keterlibatan siswa, teknostres, analisis tematik, pembelajaran berbasis game.

I. INTRODUCTION

English has become the most important language in the world. It is widely used for communication among individuals from all over the world. English has always been of special interest. Language is crucial for fostering competitiveness in all parts of life (Zh, 2021). Students are required to learn English from a young age. English is an important language as a tool for finding out information. It is also important for a student to know information not only through conversation but also from written information. Reading is the most significant way to process knowledge (Ismail et al., 2017). Through good reading skills, students can absorb information from reading. Krashen stated that listening and reading are important in the input hypothesis (Krashen & Terrell, 1983).

Reading is an important skill for processing information, as it shares characteristics with general information-processing models of memory and cognition (Schwartz et al. 1984). It entails a complicated interaction of many brain functions and cognitive processes that are required for reading and interpreting written information. According to (Mackworth, 2014) Reading involves several cognitive functions, including sensory, motor, language, attention, and various types of memory. These processes are interrelated and crucial for matching, coding, and modeling written words with stored visual patterns and mental models.

“Reading is a complex skill involving knowledge about the writing system, a lexicon of words, and access to syntactic rules used to build acceptable sentences” (Ferstl, E., & d'Arcais, G., 1999). By reading, students will directly understand how words are used in sentences and how to arrange the words correctly to produce an understandable meaning. Reading can be used as a means to make the sentences composed by students better. The learner can imitate the word order in a sentence and then apply it to their writing work. Through imitating, the learner slowly begins to understand what they are reading. Proficiency in reading affects students' ability to master vocabulary unintentionally (Pulido, 2003). When the learners read, they have to understand the message in the passage, so they tend to seek the meaning of each word. This will make them familiar with the vocabulary. Vocabulary knowledge can be acquired through extensive reading, not through teaching second language learners who have achieved reading proficiency (Coady, 1996).

Reed in Mackworth (1972) defined reading as a psycholinguistic guessing game where readers select language signals from perceptual data based on their expectations, resulting in a thought-language interaction. He explains that efficient reading involves selecting the fewest and most productive cues to make accurate guesses the first time. Neurophysiologists have discovered that brain waves (evoked potentials and background activity) reflect psychological factors like expectancy, attention, and learning, and physiological changes in the orienting response, leading to heightened sensitivity. That means reading requires active reasoning from the reader, which is

accompanied by good mastery of vocabulary and linguistics to obtain the intended information from the reading.

These days, we still find that schools choose the assessment of reading comprehension. The students are expected to master reading skills to gain more information about a text. Therefore, reading comprehension can not be achieved unless the students have a rich vocabulary and understand linguistic competence. In reality, the students have difficulty or are unwilling to gain more information because of the low engagement materials. Student engagement refers to involvement that encompasses active participation in academic and extracurricular activities, as well as dedication to learning goals (Ginting, 2021).

One of the techniques the teacher applies in class is gamification. Gamification involves applying game features and mechanics to non-game environments, such as education, to improve engagement, motivation, and learning results (Wulantari et al. 2023). This requires integrating every aspect in-game with learning materials to make the class more enjoyable. These days, gamification has already changed into a different shape due to the improvement of technology. The use of technology in gamification makes it easier to use games. Nowadays, we know gamification platforms such as Kahoot and Quizizz. Gamification of learning allows students to compete with other students to get the highest score. Using games in learning allows students to be more interested in participating in learning.

Gamification is widely used by teachers to engage students in fun activities during teaching and learning. This study discusses the role of token economies in a gamification platform called Blooket to motivate students in vocabulary learning. This study also discuss the students' constraint in game-based learning.

II. METHOD

This study employs a qualitative methodology, which focuses on exploring subjective experiences, perceptions, and meanings to generate rich, context-specific insights rather than numerical generalizations (Braun et al., 2019; Bryan & Graham, 2024). Qualitative research prioritizes depth over breadth, allowing researchers to uncover the "why" and "how" behind participants' behaviors and attitudes, as emphasized by scholars like Braun and Clarke (2006), who define it as a method for identifying patterns and themes in non-numerical data (Braun et al., 2019).

Data were collected via a questionnaire, defined by Lietz (2010) as a structured instrument for gathering self-reported information through standardized questions, enabling systematic comparison of responses. The questionnaire combined 5-point Likert-scale surveys and open-ended questions to explore senior high school students' perspectives holistically. Likert scales, developed by Rensis Likert (1932) quantify attitudes on a continuum (e.g., "strongly agree" to "strongly disagree"), balancing detail and usability. The 5-point scale was chosen to minimize respondent fatigue while capturing nuanced opinions, aligning with recommendations by Taherdoost (2022) for reliability in attitudinal research. Open-ended questions complemented this by inviting qualitative narratives (e.g., "Describe a moment when rewards motivated you"), addressing critiques that Likert scales alone lack contextual depth (Bryan & Graham, 2024).

For analysis, thematic analysis was conducted using the framework by Terry and Hayfield (2021), which emphasizes reflexive engagement with data to identify themes through iterative coding and theme development (Braun et al., 2019; Brough, 2024). Their approach involves six phases: familiarization, coding, theme identification, review, definition, and reporting, ensuring rigor and transparency in interpreting participants' lived experiences (Braun et al., 2019). This method aligns with hybrid thematic analysis practices, where Likert-scale trends contextualize qualitative narratives (Bryan & Graham, 2024).

III. RESULT AND DISCUSSION

RESULT

The results from the questionnaire showed several data points that will be presented in the diagrams below.

For the first data, the writers want to know if the students feel motivated after the learning process. This part shows that 95.2% of students felt motivated after the learning process.

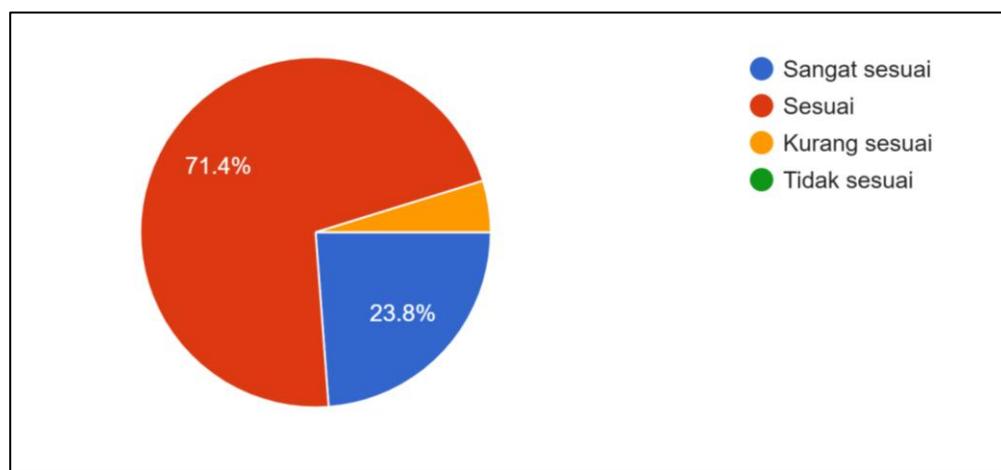


Figure 1. The Diagram of Students' Perception After Following the Learning Process

For the second data, the writers want to reveal the students' perception of whether the students feel this process can encourage them to think creatively. The result showed that the gamified learning process can give the students encouragement to think creatively. This result connects to the strategy to win the game.

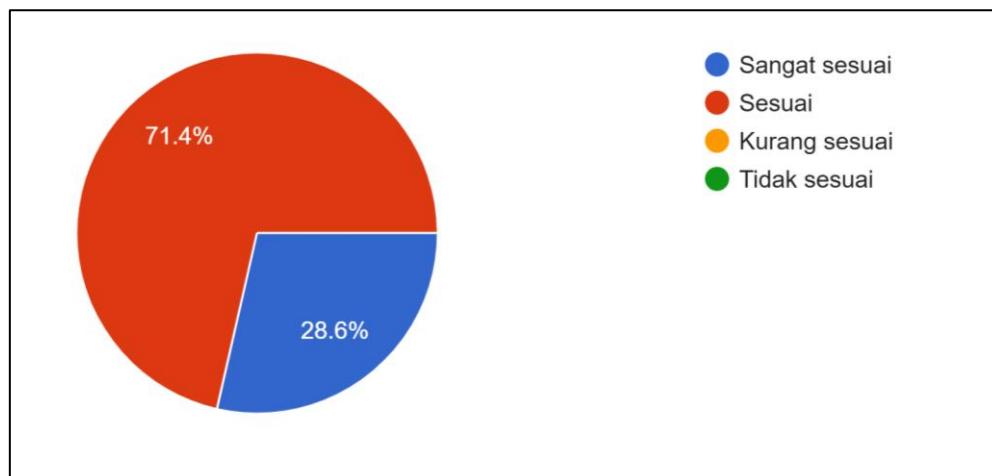


Figure 2. The Diagram of Students' Perception about Creativity

The third result for this discussion, the writers want to know if the students can understand materials better than the conventional method. The result showed that this method was able to make the students understand the learning concept better. Except that the diagram showed that 9.5% of students still need assistance to understand the material concept.

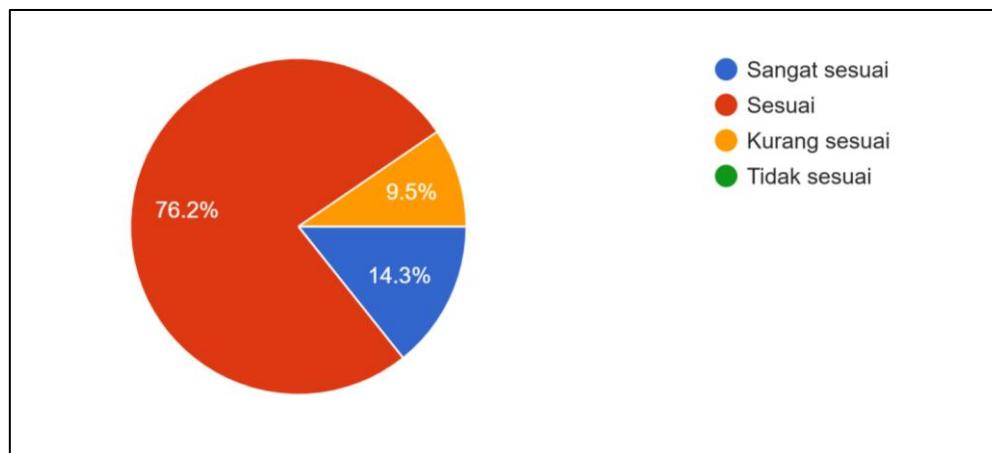


Figure 3. The Diagram of Students' Perception about Understanding Lesson Concept.

The fourth data point, the writers want to reveal the students' obstacles in this learning process related to the technology and internet connection. The result showed that the students were still facing difficulty in the gamification process. They point out the obstacles in their learning process, mostly because of the internet connection.

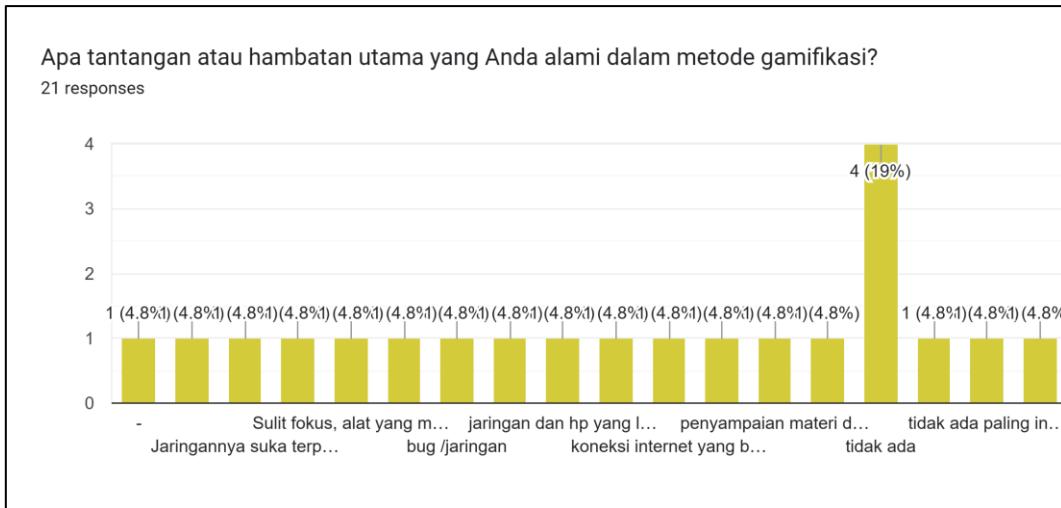


Figure 1. The Chart of Students' Obstacles in Learning Process.

DISCUSSION

This discussion critically examines the findings of the systematic literature review (SLR) on token economies as motivational scaffolds for vocabulary mastery, specifically in non-blockchain, game-based learning contexts. The analysis moves beyond a mere presentation of results to offer a reflective and critical synthesis, situating the emergent themes within the broader scholarly conversation. The discussion evaluates how these findings confirm, contradict, or extend previous research, underscores the novelty of this review, and delineates its theoretical and practical implications.

A. Synthesis and Critical Engagement with Literature

The review identified four interconnected themes central to understanding token-based gamification: motivation enhancement, creativity support, the role of instant feedback, and the challenges of technostress and infrastructure. A critical examination reveals a complex landscape where the efficacy of token economies is neither uniform nor guaranteed, but is heavily mediated by contextual, design, and individual factors.

B. Motivation Enhancement through Gamification: A Nuanced Picture

The finding that token economies can significantly enhance intrinsic motivation extends the findings of prominent meta-analyses like that of Zainuddin et al. (2020), which reported a 23% higher increase in motivation for gamified learning. This review, however, adds crucial nuance to this general consensus. It highlights that the motivational potency of tokens is critically dependent on their perceived value and relevance, a dimension often understated in broader gamification literature. For instance, while digital tokens are effective in well-resourced settings, this review corroborates Huang et al.'s (2021) observation that in contexts with technological limitations, social or tangible rewards (e.g., teacher praise, physical prizes) can be more potent. This juxtaposition contrasts with a common techno-centric narrative in gamification research, underscoring that the *symbolic value* of the token, not merely its digital form, drives motivation. Therefore, the claim of enhanced motivation is supported but must be qualified: token economies

serve as effective motivational scaffolds primarily when the reward system is meaningfully aligned with learner context and needs, moving beyond a one-size-fits-all application of digital points.

C. Creativity Enhancement: Beyond Behavioral Reinforcement

The association between token-based systems and enhanced creativity presents a compelling extension of traditional token economy frameworks. Classical literature, such as the work reviewed by Smith et al. (2022), primarily frames tokens as tools for reinforcing discrete, pre-defined academic or social behaviors. Contrary to this somewhat behaviorist confine, the findings here demonstrate how token mechanics in games like Blooket can foster strategic planning and creative problem-solving. Students are not merely rewarded for a correct answer (vocabulary recall) but are engaged in a meta-game of resource management (e.g., using earned tokens to strategically expand a virtual restaurant). This aligns with and extends the findings of Koivisto and Hamari (2023) and García-López et al. (2023), who link gamification to psychological needs for autonomy and competence. This review specifies that token economies, when embedded in narrative-driven, goal-oriented game environments, can satisfy these needs by offering *goal-driven choices* (autonomy) that require creative strategy formulation (competence). Thus, the token transitions from a simple reinforcer to a *currency for creative agency*, a nuanced role less emphasized in prior SLRs focused on classroom management or basic skill acquisition.

D. Instant Feedback: Operationalizing Conditioning Theory

The overwhelming positive response to instant feedback (95.3% in the primary data) robustly supports the established principles of operant conditioning (Skinner, as discussed by Schlinger, 2021) and the pedagogical value of timely correction. This review's contribution lies in its critical examination of *how* gamification operationalizes this theory. It confirms that platforms effectively use tokens for positive reinforcement and mild penalties (e.g., lost time) for errors. However, it adds a critical layer by interrogating feedback design. The warning against overly punitive or vague feedback systems contrasts with less critical implementations that prioritize game mechanics over learning science. The discussion on balancing extrinsic rewards with intrinsic motivation to avoid the *overjustification effect* (Lepper et al., 1973) is vital. This review synthesizes evidence (e.g., Krause et al., 2015; Kumar & Vairavan, 2024) to argue that the most effective token-feedback loops are those that are *specific, actionable, and gradually fade* the prominence of the token reward, thereby internalizing the learning habit. This moves the discussion from "feedback is good" to a more sophisticated analysis of the conditions under which token-contingent feedback succeeds or fails.

E. Technostress and Infrastructure Constraints: The Critical Counterpoint

Perhaps the most critical and differentiating theme of this review is its substantive focus on technostress and infrastructural barriers. Many reviews of gamification (e.g., Zainuddin et al., 2020) acknowledge limitations but often treat them as peripheral concerns. Unlike prior studies, this review elevates these constraints to a central thematic finding, revealing them as a significant potential moderator of all the aforementioned benefits. The empirical data on disconnected networks, unsupported devices, and system bugs, corroborated by studies like Liao et al. (2021)

and Yao & Wang (2023), presents a stark reality check. It demonstrates that the motivational and creative benefits of token economies are contingent upon a stable and accessible technological base. This finding adds substantial nuance to the often-optimistic discourse on digital gamification, highlighting a digital divide in its implementation. Technostress arising from complexity, overload, and instability can directly cancel out the intended motivational gains, leading to disengagement (Berger et al., 2023). This theme forces a critical reflection: the successful implementation of token economies is as much a question of equitable access and robust design as it is of pedagogical theory.

F. Novelty and Contribution of This Review

This review offers a novel perspective by synthesizing research on *non-blockchain* token economies specifically for *vocabulary mastery* within *game-based learning*, a triangulation of focus that distinguishes it from broader gamification or generic token economy SLRs. The findings reveal an understudied aspect of the discourse: the interplay between token-based motivation and the fostering of higher-order cognitive skills like creativity within game narratives, beyond basic behavior modification.

Most significantly, unlike prior studies that might list "technical issues" as a limitation, this review analytically frames technostress and infrastructure as a core, thematic challenge that fundamentally conditions the applicability and equity of token-based interventions. It argues that the socio-technical context is not a backdrop but a critical variable, a perspective that integrates educational technology research with instructional design in a necessary and critical way. By doing so, it provides a more holistic, critical, and realistic appraisal of token economies, acknowledging their promise while rigorously delineating their boundaries and prerequisites.

G. Theoretical and Practical Implications

Theoretically, this review contributes to a more nuanced model of token economies in education. It suggests that their effectiveness is best explained by a *contextualized reinforcement theory*, where the impact of tokens is mediated by (a) their socio-cultural value to the learner, (b) their embeddedness in autonomy-supportive and cognitively complex tasks, (c) the quality of the feedback loop they enable, and (d) the transparency and reliability of the technological medium delivering them. It challenges purely behavioral accounts by incorporating elements from Self-Determination Theory (autonomy, competence) and cognitive load theory (technostress as an extraneous load).

Practically, the implications are clear and actionable:

1. For Designers: Gamification and token system designs must prioritize robust, lightweight applications that minimize technical barriers. Feedback must be instructive, not merely punitive. Reward schedules and token values should be adaptable to different contexts (digital vs. physical/hybrid).
2. For Educators and Practitioners: Implementation must begin with an audit of technological infrastructure and student access. A blended approach, using physical tokens or social rewards where technology is unreliable, is recommended. The focus should be on linking tokens to creative application of vocabulary, not just rote memorization.

3. For Institutions and Policymakers: Investing in equitable digital infrastructure is a prerequisite for the successful rollout of digital gamification strategies. Professional development should train educators not only in using gamification tools but also in critically assessing their design and adapting them to mitigate technostress.
4. For Researchers: Future studies should employ more mixed-methods designs to deeply explore the learner experience of technostress. Longitudinal research is needed to see if the motivational effects of tokens persist after their removal and how they impact long-term vocabulary retention.

In conclusion, this systematic review affirms the potential of non-blockchain token economies as powerful motivational scaffolds for vocabulary mastery but does so through a critical and reflective lens. It confirms their role in enhancing motivation and creativity through well-designed feedback loops, in line with established theories. However, it crucially extends the discourse by highlighting the creative affordances of token systems and, most importantly, by identifying technostress and infrastructure as decisive factors that can undermine their efficacy. The novelty of this review lies in this balanced, context-sensitive synthesis, which moves beyond evangelical praise for gamification to offer a evidence-based, critical framework for its effective and equitable implementation. The ultimate contribution is a call for a more sophisticated, learner-centered, and infrastructure-aware approach to deploying token economies in education.

IV. CONCLUSION

This study shows that gamification, which is based on Skinner's operant conditioning theory, provides significant corrective feedback and rewards (such as badges and tokens) to students' engagement and learning behavior. External motivators such as tokens increase perseverance and engagement in short-term tasks. However, challenges such as technostress (caused by slow networks and complex interfaces) and over-reliance on competitive mechanisms (such as leaderboards) risk reducing internal motivation and decreasing engagement. Students favor balanced gamification, which aligns with pedagogical goals, prioritizes easy-to-understand design, and aligns competition with cooperation. The reflexive thematic analysis underscores the importance of contextual adaptability, where rewards and feedback must match the needs and technological realities of diverse learners.

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