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AI-Gamified Model for EFL: Fostering Metacognition, Critical Literary and Creativite Thinking in ELT Design

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Abstrak

Penelitian ini menyajikan sebuah model pembelajaran inovatif dan mengimplementasikan umpan balik AI-gamified dengan kolaborasi dan partisipasi yang terintegrasi serta mempromosikan metakognisi mahasiswa, kemampuan berpikir kritis dalam literasi, dan performa kreativitas dalam desain English Language Teaching (ELT). Berlandaskan Taksonomi Bloom dan teori Vygotsky, studi ini tidak hanya bertujuan menggabungkan AI-gamification sebagai alat teknologi, tetapi sebagai pembelajaran terarah yang memediasi keterampilan berpikir tingkat tinggi, menumbuhkan pembelajaran yang teratur secara mandiri, mendorong konstruksi pengetahuan dan pembelajaran bermakna di kelas, serta mempromosikan desain kreatif dalam konteks ELT. Model ini mengusulkan AIG–TriMind Model, sebuah kerangka pembelajaran AI-Gamified yang dirancang untuk mentransformasi pengajaran English as a Foreign Language (EFL) dengan mendorong metakognisi, literasi kritis, dan pemikiran kreatif dalam desain English Language Teaching (ELT). AIG–TriMind Model mengonseptualisasikan bagaimana umpan balik berbasis AI, korporasi pembelajaran gamified, dan desain ELT interaktif dapat bekerja bersama untuk mendorong kemampuan berpikir kritis dan literasi mahasiswa, mempromosikan metakognisi, dan desain bahasa yang kreatif. Model ini menekankan pengalaman belajar yang partisipatif dan adaptif yang didukung oleh pengambilan keputusan yang dimediasi AI dan kreativitas performatif. Studi ini berargumen bahwa mengintegrasikan gamifikasi cerdas ke dalam ELT mampu menempatkan mahasiswa sebagai desainer aktif dalam pembelajaran ELT sekaligus memperkuat metakognisi mereka dalam mengatur rencana, penyelesaian masalah dan mengevaluasi progress pembelajaran. Implikasi teoretis dan praktis menyoroti perlunya pergeseran paradigma dalam pedagogi EFL menuju pengembangan TriMind berbasis AI dan Gmifikasi serta mengusulkan penelitian lanjutan untuk memvalidasi model tersebut dalam konteks pembelajaran lainnya.

Kata Kunci: Model Gomifikasi dan, Metacognitif, Kritikal Literasi, Berpikir Kreatif dan Adaptive.

Abstract

This paper presents an innovative learning model and implemented AI-gamified feedback with collaborative and participative corporation as well as promoting students' metacognition, critical in literary and creativity performance inEnglish Language Teaching (ELT) design. Grounded in Taxonomy bloom's and Vygotsky's theory, the study aimed not merely corporate the AI-gamification as technological tool, but as a mediated learning supports higher-order thinking skills, fosters self regulated learning, encourages meaningful knowledge and classroom construction, as well as promote

creativity design in ELT setting. The model proposes the AIG-TriMind Model, an AI-Gamified learning framework designed to transform English as a Foreign Language (EFL) instruction by fostering metacognition, critical literacy, and creative thinking in English Language Teaching (ELT) design. the AIG-TriMind Model conceptualizes how AI-powered feedback, gamified learning corporation, and interactive ELT design can work together to foster students' critical thinking and literacy, promote metacognition and creative language design. The model emphasizes participative and adaptive learning experiences supported by AI-mediated decision-making and performance creativity. This paper argues that integrating intelligent gamification into ELT able to reposition students as active designers of ELT learning while strengthening their metacognition in self-awareness. The theoretical and practical implications highlight the need for a paradigm shift in EFL pedagogy toward AI-supported HOTS development and propose a further research for validating the model in other instructional contexts.

***Keywords**: AI-Gamified Model, Metacognition, Critical Literacy, Creative and Adaptive Thinking.*

Introduction

The rapid transformation in ELT corporated with Artificial Intelligence (AI) has redesigned pedagogical innovation in English Language Teaching, designing instruction from conventional instruction teachers' classroom to personalized, adaptive and technology and digital learning environments. The platforms of gamified resolves problems by providing feedback fitures, multimodal learning support management, and adaptive ELT design that expand learners' learning autonomy (Holmes et al., 2022). Similar to this, gamification's power has emerged as a transformation engagement and collaboration mechanism that motivate learners through reward systems, challenges, creativity and interactive tasks (Deterding et al., 2011) where the combination of these items offers a transformative learning capable of strengthening Higher-Order Thinking Skills (HOTS), which include metacognitive, critical, and creative decision in designing ELT for the classroom instructional.

Highlighting the crucial learning of HOTS-based learning in adapting reflective and analytical language users. Bloom's Revised Taxonomy emphasizes the progression from memorizing to creating, underline the need for instructional designs that promote as well as fostering reasoning, evaluation, and synthesis (Anderson & Krathwohl, 2001). Meanwhile, Vygotsky's theory explains how cognitive development is strengthened through mediated tools and collaborative learning, where design of learning plays a central role in helping learners internalize complex (Vygotsky, 1978). However, current EFL practices often remain limited to comprehension-level exercises, teacher-dominated interactions, and non-differentiated feedback.

This gap indicates a pressing need for transformative instructional frameworks that integrate advanced technologies with adapted model for ELT setting. Several empirical studies explored AI-assisted feedback tools (Zhai et al., 2023; Dwivedi et al., 2024) or gamified English learning apps, however remain limitation that promote integrated and instructional model that combines AI, gamification, metacognitive awareness (Winne & Azevedo, 2014; Zimmerman, 2002), literacy-based critical thinking, and creativity in ELT designing material. Existing models tend to focus both in technological or in English components and comprehension, (Moubayed et al., 2020). Moreover, the lack of conceptual frameworks that connect students' collaborative participation, classroom activities, and technology-enhanced in ELT design creates a theoretical gap in EFL instructional innovation. This gap becomes more crucial as educators aim to prepare learners capable of comprehending English components, critical thinking, metacognition and creativity in design.

To address these challenges in order to bring this dimension in one innovative novelty of the model, we promote the AIG-TriMind Model for EFL, a holistic framework designed to enhance metacognition, critical thinking literacy, and creative performance within ELT design into classroom collaborative and participative setting corporating with AI dan Gamification (Gantsetseg, 2025).

The model integrates AI-generated adaptive feedback, gamified learning pathways, collaborative classroom participation, and literacy-driven tasks. This

framework positions learners as active co-creators of knowledge rather than passive recipients, aligning technological affordances with core cognitive and sociocultural theories. The proposed model expands existing pedagogical approaches by offering a theoretically grounded, future-oriented blueprint for English learning environments that are engaging, ref lective, and corporating both concept in digital dan instructional classroom copntext.

Problem Research

Based on the above exploration and limitation found from the literature, the problem of this study formulated as follow:

1. Why do the corporatoion and integration of AI, gamification, and HOTS skills need to be combined into a single integrated learning model for ELT?
2. How does the the proposed of AIG-Trimind Model contribute to future ELT instructional design and practice?

Research Objective

The objective of the resaearch are:

1. To identify the theoretical and pedagogical rationale for integrating AI, gamification, and HOTS oriented skills into a unified instructional model for ELT.
2. To conceptualize the contribution of the proposed AIG–TriMind Model in developing future ELT instructional design and practices.

Significance of the research

This research expected to give contribution to theoritical and practical in ELT as follows:

1. Theoretical Significance

This study expected to contribute to ELT context that connects to AI learning components, gamification practice, feedback in both digital and real time management, and corporation of HOTS critical to metacognition and creativity within a single instructional framework.

2. Practical Significance

This research offer a contribution of AIG-TriMind model as a guide for teachers, curriculum designers and educational practitioners in order they can design the ELT management and instruction based on their needs and skills of english components. All contribution in teaching and practice are expected to be more participative, adaptive and collaborative taht work together in one instructional method.

Method

This study research employed a conceptual model development design in order to construct the propose framework created in this research, AIG–TriMind Model, the development construction is following the Pace's (2000) principle of scholarly model building, which integrates critical analysis, theoretical synthesis, and conceptual refinement to generate new theoretical contributions. The AIG–TriMind model was developed through three analytical phases: (1) concept synthesis, drawing from AI-assisted language learning research (Zhai et al., 2023; Dwivedi et al., 2024), frameworks of gamification (Deterding et al., 2011), metacognitive and self-regulated learning theories (Zimmerman, 2002; Winne & Azevedo, 2014), and lastly analytical phase is HOTS frameworks (Anderson & Krathwohl, 2001); (2) theoretical integration, guided by sociocultural theory where cognitive growth is mediated through tools and collaboration (Vygotsky, 1978); and (3) model formulation, which involved refining the conceptual relationships into a coherent instructional framework.

Result and Discussion

The theoretical and pedagogical rationale for integrating AI, gamification, and HOTS oriented skills into ELT Model.

The analysis revealed a strong theoretical and pedagogical foundation for the corporation of unifying AI, gamification, and HOTS skills particularly in critical thinking, metacognitive in self-awareness, and creativity in designing ELT materials into a single instructional proposed model for ELT teaching and learning construction. A synthesis of prior studies reveals that AI-assisted feedback systems

enhance learners' self-regulation and reflective monitoring (Winne & Azevedo, 2014; Zhai et al., 2023), while gamification promotes participation, engagement, persistence, feedback in various real time practicing and interactive learning pathways (Deterding et al., 2011, Samad, 2022, Saamd, 2024, Pratiwi, 2025). However, these innovations have often been adopted separately, producing fragmented instructional practices that fail to fully support learners' higher-order thinking with collaboration in real time classroom management and instruction. Meanwhile, Bloom's Revised Taxonomy underlines the need for pedagogical designs that extend as well as corporate beyond comprehension toward evaluation and creation (Anderson & Krathwohl, 2001), and Vygotsky's sociocultural theory highlights the importance of mediated tools and collaborative learning in internalizing complex knowledge (Vygotsky, 1978).

AI applied as a crucial component for fostering and collaborating metacognition, as its adaptive and automated feedback helps learners monitor mistakes and manage preparation and evaluate their language performance in ways that naturally support their self-regulated learning (Mazari & Zafi 2025), therefore, they adapt solving problems due to their practical skills progress (Masitoh et al, 2023; Zhang & Thing, 2025). Beside AI corporation elements within this propose model, Gamification was found to create meaningful conditions for critical thinking through challenge-based tasks, decision-making context, and problem-solving independently that push students to evaluate, analyze and justify linguistic choices, essays and collaboration (Nursyaida & Samad, 2024; Srivastava et al, 2025). Meanwhile, creative thinking is strengthened through AI-supported multimodal tasks and gamified design activities that encourage learners to generate original ideas, explore alternative expressions, and construct imaginative language outputs as well as creating new design to their media learning isntrcution. The synthesis of the literature indicates that these three thinking dimensions metacognitive, critical, and creative develop most effectively when supported simultaneously rather than in isolation, as each reinforces different layers of higher-order thinking required in ELT. For this reason, integrating AI and gamification within a HOTS-driven framework to metacognition, critical and creative transformation provides a coherent and mutually reinforcing pedagogical structure, forming the conceptual basis for the development of the AIG–TriMind Model as a unified learning design for future ELT practices.

For this reason, integrating AI and gamification within a HOTS-driven framework to metacognition, critical and creative transformation provides a coherent and theoretically grounded foundation for rethinking ELT instructional design. Without such integration, pedagogical innovation remains fragmented AI improves feedback, gamification enhances engagement, and HOTS promotes thinking skills, but none of them independently produce deep, reflective, and transformative learning. The literature therefore strongly indicates that a unified model is needed to bridge these gaps and align cognitive, technological, and pedagogical elements into a single purposeful ELT design. This synthesis becomes the conceptual basis for developing the AIG–TriMind Model presented in the following section.

AIG-TriMind Model in developing future ELT instructional design and practices

The findings studie the strong theoretical, pedagogical and empirical in rationale which bring together regarding the unifyinh of AI, Gamification and HOTS components of criticsl thinking, metacognitive and creativity. Literature in AI corporation language learning consistently reports that the feedback mechanisms expands learners' metacognitive in monitoring, management setting as well as , reflective judgment, and self-regulated learning (Winne & Azevedo, 2014; Panadero, 2017; Zhai et al., 2023). AI's adaptive diagnostic features provide immediate, personalized scaffolding that supports students' ability to plan, monitor, and evaluate to further progress and decision to problem solving (Azevedo & Hadwin, 2020). At the same time, research on gamification shows that well-designed game mechanics such as point systems, badges, leaderboards, missions,

and narrative challenges significantly increase engagement, collaboration, and critical thinking behaviors in language learning environments (Deterding et al., 2011; Kim, 2020; Nah et al., 2021). These approaches, however, are often implemented separately, leading to propose the framework pedagogical designs that do not fully activate higher-order thinking or collaborative decision-making as well as increasing creativity in ELT development.

Bloom's Revised Taxonomy emphasizes that effective learning must create progress toward evaluation and creation as the highest cognitive levels essential for modern ELT practice (Anderson & Krathwohl, 2001). To this line, Vygotsky's sociocultural theory also reinforces the role of utilizing tools, social collaboration in classroom activities, and cognitive apprenticeship in internalizing complex knowledge (Vygotsky, 1978). The integration of gamification and AI aligns directly with these principles by providing digital tools, material, and participatory and collaborative learning pathways that strengthen reflective reasoning, analytical judgment, and creative expression. Research has further shown that creativity in ELT and language tasks is enhanced when learners are exposed to multimodal inputs, interactive and participative environments, and exploratory design-based tasks supported by intelligent technologies (Li & Yang, 2023; Hyland, 2020; Hamdun et al, 2025). Similarly, critical literacy is strengthened when learners must justify and considering decisions, evaluate linguistic accurac in written and oral communicationy, and negotiate meanings in interactive, problem-based contexts (Wallace, 2003; Shin & Crookes, 2005).

In this study, the **AIG-TriMind** Model propose, emerges as a comprehensive conceptual synthesis that involved in these theoretical strands. AI supports the Metacognitive Mind through adaptive feedback, automated performance analysis, and reflective prompts that help learners considering to evaluate and explore materialin advance learning, understand their strengths, evaluate their weaknesses, and be confidence to decision-making processes. In a term of Gamification activates the Critical Mind by linked the games, follow the analytical challenges, understanding the linguistic comparisons, apply the decision-making, and evaluation-based missions that require students to justify choices and examine evidence. Meanwhile, creative thinking is stimulated through multimodal AI-output generation, gamified design tasks, and collaborative meaning-making activities that encourage learners to produce original expressions, explore alternatives, and construct unique ELT materials (Cropley, 2011; Sawyer, 2012). The literature strongly suggests that these three thinking dimensions mutually reinforce each other when integrated, enabling higher-order language processing and transformative learning rather than mechanical task completion (Halpern, 2014; Lai, 2011).

The results also revealed that the AIG-TriMind Model offers important contributions to further ELT design and practice. By integrating the adaptation of AI, linked the gamified engagement, and HOTS driven cognitive tasks and practices, the model redesigns ELT into a various, collaborative, participatory, and cognitively challenging environment. It shifts the role of learners from passive respond and feedback toward active designers, problem-solvers, and reflective decision-makers aligning with contemporary views of 21st-century education (Trilling & Fadel, 2009; Voogt & Roblin, 2012). For teachers, the model provides a structured blueprint for designing lessons that blend intelligent systems with creativity-building and critical literacy tasks, addressing the need for more innovative and integrated ELT pedagogies (Zawacki-Richter et al., 2019). At the institutional level, the model responds to current calls for AI-supported curriculum transformation and integrated HOTS competencies as essential components of modern language education ecosystems.

Overall, the integration of AI, gamification, and HOTS oriented thinking through the AIG–TRIMIND Model propose and establish a coherent theoretical foundation and a future ready pedagogical approach. By foregrounding the Three Minds Metacognitive, Critical, and Creative ast the model of a transformative framework capable of enhancing ELT instruction, strengthening learner autonomy and reflective capacity, as well as fostering deeper comprehension and evaluation to reach more meaningful language learning. This synergy proves that the coroporation and integration of technologies and ELT development is not merely additive, but essential for constructing for advance and high impacts

learning experiences in the term of EFL education and development.

Conclusion

This study proposes and develops the AIG–TriMind Model which designed to integrated conceptual framework utilizing AI-assisted feedback, gamification, and HOTS-oriented skills particulsrly in metacognitive, critical thinking, and creative in designing into a coherent instructional system for English Language Teaching (ELT). The theoretical and pedagogical analysis demonstrated that these components, although powerful on their own, yield deeper learning impacts when combined into a single model. AI functions as an adaptive system that guides learners through personalized support, such as gamification sustains engagement, persistence, and active participation inside and outside classroom management and HOTS component frameworks provide the expand foundation for reflective evaluation, analytical reasoning, and creative design. When they are integrated, they create a participative, collaborative, adaptive, in digital technology and real time classroom management and instruction.

Limitation

Although the AIG-TriMind Model offers a theoretically and pedagogically framework, this study remains. Several limitations; Firstly, the research employed a conceptual model development approach, meaning the model is still grounded in theoretical synthesis rather than empirical validation. While the integration draws from strong foundations in AI-assisted learning, gamification theory, and HOTS pedagogy, the model has not yet been tested in real classroom environments or measured for its direct impact on learners' performance. Secondly, this study focuses primarily on metacognitive, critical, and creative thinking skills, without examining other cognitive domains such as comprehension, memory, or linguistic accuracy, which may also interact with AI and gamified instruction. Lastly, contextual variables such as teachers' technological proficiency, institutional readiness, digital access, and classroom culture may influence an expand effectiveness of the model when applied in practice.

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