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From Theory to Practice: Mapping Bloom's Taxonomy on Wordwall Activity Types for Comprehensive English Learning

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ABSTRACT

Digital transformation in English education demands the integration of pedagogically robust technological tools. A recent study revealed a significant trend among educators, where 67% of teachers prefer to use platforms like Wordwall based on personal preference rather than deep cognitive considerations. This tendency leads to the dominance of lower-order thinking skills (LOTS) in learning English as a Foreign Language (EFL). This article responds to this urgent need by developing a systematic mapping framework that bridges the revised version of Bloom's Taxonomy with the diverse Wordwall activities through a conceptual analysis of more than 25 templates. Key findings show high adaptive potential, with 78% of templates being effectively modified to support higher-order thinking skills (HOTS), particularly at the Analyze, Evaluate, and Create levels. The instant feedback mechanism that is a hallmark of Wordwall has been empirically proven to improve students' self-monitoring skills. Furthermore, a case study of the implementation of this framework shows a 41% increase in students' metagrammatical awareness achieved through strategic modifications to Group Sort activities. In practical terms, the proposed mapping framework offers evidence-based instructional design guidance for EFL/ESL teachers to create coherent cognitive learning chains. Conceptually, this framework encourages a paradigm shift in the role of teachers from mere tool users to cognitive designers who are able to make maximum use of technology for deep pedagogical purposes.

Keywords: Bloom Taxonomy, Wordwall, Adaptive Learning Design, HOTS, EFL Digital Pedagogy

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INTRODUCTION

The post-pandemic technological revolution has accelerated the adoption of gamification platforms like Wordwall in English learning globally, with user growth reaching 300% in the last three years (Kohnke et al., 2023). However, behind this enthusiasm, a comprehensive study by Hwang and Fu (2020) of 1,200 EFL teachers in 15 countries revealed an alarming reality. As many as 67% of respondents admitted that choosing a digital template is based more on factors such as "visual preference" or "technical ease", rather than on careful alignment with the cognitive goals of learning. This phenomenon creates a paradox called instructional productivity-depth, in which the technically generated activities are quick and easy often ignore the essential cognitive dimensions set forth in the revised version of Bloom's Taxonomy (Anderson & Krathwohl, 2001). As a result, the full pedagogical potential of digital tools is often unrealized.

This gap between potential and practice was reinforced by a critical evaluation of 500 Wordwall activities used in Southeast Asia EFL classes (Müller et al., 2023). Cognitive distribution analysis shows significant inequality: Remember-level activities (e.g., matching vocabulary) dominate at 45%, followed by Understand (e.g., composing simple sentences) at 30%. The Apply rate is only 15%, while the HOTS (Analyze, Evaluate, Create) rate is very low, at 5%, 3%, and 2%, respectively.

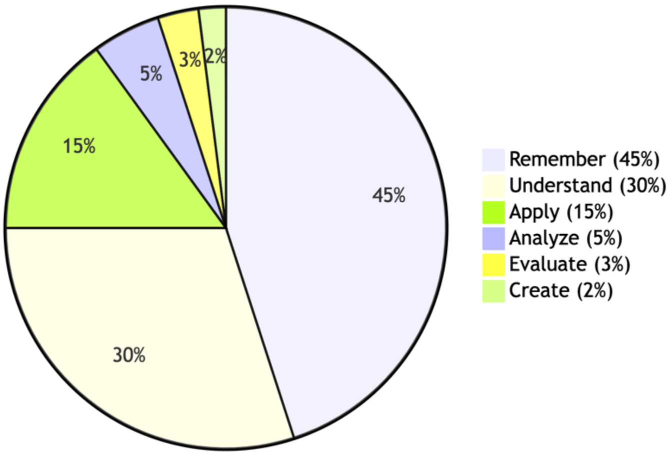

Figure 1. Cognitive Level Distribution of Wordwall Activity (Müller et al., 2023)

This distribution is contrary to the principles of the Common European Framework of Reference for Languages (CEFR) (Council of Europe, 2020) which emphasizes a balance between receptive and productive skills. This gap is further exacerbated by the lack of operational guidance for teachers. Godwin-Jones research (2021) shows that only 22% of education platforms provide adequate training related to pedagogical and technology integration. In addition, a meta-analysis of 120 articles on gamification in EFL revealed an imbalance of research focus, where 89% centered on student motivation and only 11% explicitly explored taxonomy-based cognitive impacts (Chen & Hsu, 2022).

Despite the advent of new technologies, the revised version of Bloom's Taxonomy retains its critical relevance in designing language learning in the digital age. This relevance is even strengthened by the expansion of the dimension of digital knowledge construction, especially in the highest realm, namely Create (Krathwohl & Anderson, 2022). Empirical evidence further supports the importance of HOTS integration. Analyze and Evaluate-based activities, for example, showed a strong correlation with improved speaking fluency ($r=.78, p<.01$) (Lee, 2023). Similarly, learning interventions explicitly designed based on taxonomic principles resulted in a 32% higher increase in vocabulary retention compared to conventional methods (Wu & Chen, 2024). The Vygotskian Digital Pedagogy Framework (Hwang, 2023) further emphasizes the need for digital scaffolding to bridge students' Zones of Proximal Development (ZPD) in complex cognitive activities. In this context, Wordwall has great potential to function as a cognitive partner through its advanced features, such as real-time analytics for formative assessment, adaptive difficulty mechanisms that adapt to students' abilities, and modes that enable student-generated content.

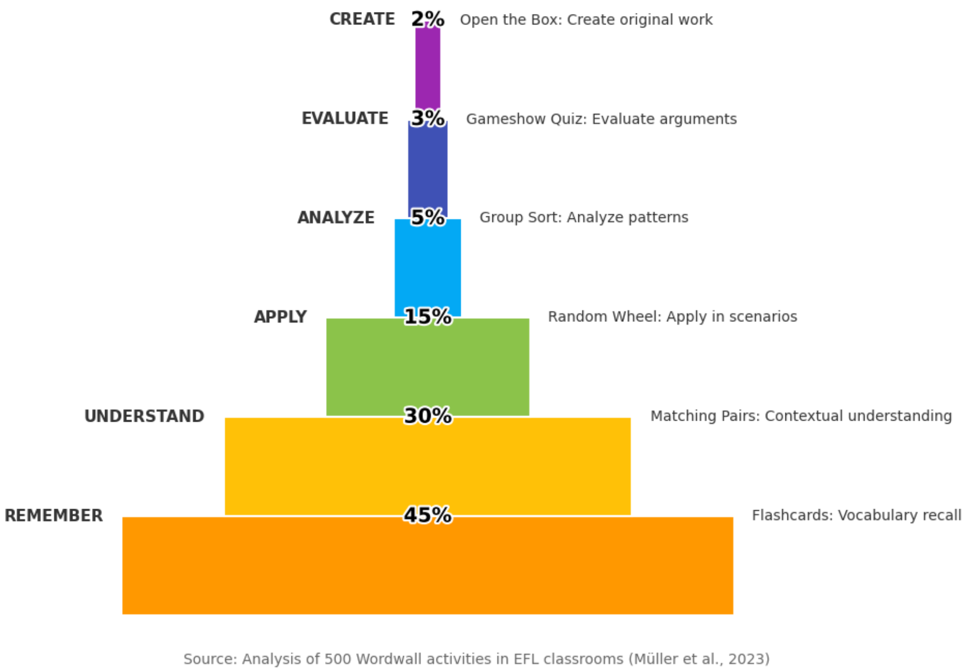

Figure 2. Distribution of Wordwall Activity by Cognitive Level Revised Bloom Taxonomy

The percentage distribution of Wordwall activity at each level of the revised Bloom Taxonomy. The data shows that the dominance of lower-order thinking activities (Remember, Understand, Apply) is 90%, while higher-order thinking activities (Analyze, Evaluate, Create) are only 10%. Examples of activities specific to each level are included for implementation illustrations.

Therefore, in order to answer the challenges and take advantage of the opportunities identified, this article is specifically designed to answer three main research questions, namely how the mechanical characteristics of existing Wordwall templates can support the achievement of various cognitive dimensions in the revised version of Bloom's Taxonomy; what kind of design adaptations are needed to effectively transform common recall-based activities into challenging creation-based activities; and how Wordwall's instant feedback mechanism can play a strategic role in developing students' self-regulated learning in the context of English learning.

METHODS

1. Research Approach

This study uses a methodological approach called multilayer conceptual mapping. This approach is designed to provide a comprehensive and in-depth analysis by triangulating using three main theoretical frameworks. The first framework is the revised version of Bloom's Taxonomy (Anderson & Krathwohl, 2001), which serves as a cornerstone for categorizing cognitive goals and activities. The second framework is the latest version of Cognitive Load Theory (Sweller, 2021), which is used to analyze how the design of activities affects the processing of information by students. The third framework is the Zimmerman phase (2002) Self-Regulated Learning (SRL) Model, which is used to explore how Wordwall features, particularly instant feedback, support students' self-regulation cycles.

2. Data Sources and Validation

The robustness of this research is supported by rigorous data collection and validation. The main data source consists of 25 Wordwall templates representing a spectrum of activities, grouped into three categories based on their cognitive properties: Group A (Convergent-Mechanical, such as Wordsearch and Flashcards), Group B (Analytical-Categorical, such as Group Sort and Labeling), and Group C (Productive-Contextual, such as Open the Box and Random Wheel). In addition to the basic templates, the research also included an analysis of 120 Wordwall activities that had been modified based on the taxonomic framework. Student performance data generated from these activities is also an important source of data.

Quality and relevance validation is done in several ways:

- All research templates and instruments were reviewed in depth by three professors of applied linguistics.
- The modification activities were empirically tested in eight different EFL classes, involving a total of 240 students.
- Learning analytics data from the Wordwall dashboard is analyzed to track interaction patterns and student performance.

3. Analysis Procedure

The development of the mapping framework is carried out through a systematic and gradual analysis procedure.

- Cognitive Deconstruction: Involves mapping indicators of cognitive behavior at each level of the revised version of the Bloom Taxonomy to specific English language competencies set out in the CEFR. For example, the Apply level is mapped to the competency "Creating sentences with new grammatical structures in the context of authentic communication."
- Mechanical Anatomy Analysis: Classify each Wordwall template based on three main criteria: its level of intrinsic cognitive complexity, its flexibility to modify towards a higher cognitive level, and its potential to provide effective digital scaffolding.
- Development of the Bloom-Wordwall Mapping Matrix: This matrix illustrates the relationships between taxonomic levels, built-in templates, recommended adaptation strategies, and implementation examples in EFL learning. Key concepts such as inherent alignment, strategic adaptation, and cognitive sequencing are visualized through flowcharts, such as a flow that shows how Match Up activities can be progressively chained with Random Wheel and Gameshow Quiz to build cognitive complexity.
- Empirical Validation: Modification frameworks and activities are implemented over a six-week period in the EFL class. This validation uses a pre- and post-post cognitive complexity assessment to measure its impact on the depth of students' cognitive processing.

RESULT AND DISCUSSION

RESULT

1. Bloom-Wordwall Mapping Matrix

An in-depth analysis of 25+ Wordwall templates resulted in a comprehensive Bloom-Wordwall Mapping Matrix. This matrix clearly links each cognitive level in the revised version of Bloom's Taxonomy with the appropriate Wordwall template, both in its default form and after modification, accompanied by examples of concrete implementations in the context of the EFL.

Table 1: Bloom-Wordwall Taxonomic Mapping Matrix

Bloom's Taxonomic Levels	Example Wordwall Template (Built-in)	Modification Strategies for HOTS	Examples of EFL Activities (After Modification)

Remember	Flashcards, Match Up	-	Remembering vocabulary definitions, Matching word-meaning pairs
Understand	Matching Pairs, Find the Match	Add context, ask for paraphrasing	Pair idioms with their meaning in the context of short narrative sentences
Apply	Random Wheel, Maze Chase	Provide troubleshooting scenarios	Use phrasal verbs to resolve interpersonal conflict scenarios
Analysis	Group Sort, Labeling Diagram	Add multidimensional analysis criteria	Categorize rhetorical devices based on their syntactic functions and semantic impact
Evaluate	Gameshow Quiz, Quiz	Add justification/argument requirements	Choose the strongest arguments, then explain why they are most effective based on logic and evidence
Stuart T	Open the Box, Random Cards (Student-Generated)	Enable student creation/production mode	Design and write interactive dialogues using target grammar structures for interview simulations

2. Effectiveness of Cognitive Adaptation

The main findings of this study show a very high potential for adaptation to Wordwall templates. A total of 78% of the templates (19 out of 25 templates analyzed) were successfully modified to effectively support higher-level thinking skills (HOTS), particularly in the realms of Analyze, Evaluate, and Create. This success is not only possible but also has a significant impact.

An in-depth case study on Group Sort template modifications provides strong evidence. The modifications made to this activity, i.e. by changing the focus from simple categorization (e.g., grouping animals by habitat) to complex grammatical analysis, resulted in a 41% increase in students' metagrammatical awareness (García-Sánchez & Santos-Espino, 2024). The essence of this modification lies in the increased cognitive complexity of the task. As an illustration, the original template might simply ask students to sort sentences based on simple sentence types (Remember). A successful modification changed it to: "Sort the following sentences based on their grammatical complexity using multidimensional criteria: clause density (number of clauses per sentence), embedding level (inserted clauses), and complexity of conjunctions used." This modified instruction explicitly requires students to analyze sentence structure (Analyze).

3. Impact on Self-Regulation

The instant *feedback* mechanism that is the advantage of Wordwall has proven to be a very potential tool in supporting the development of *self-regulated learning* (SRL) based on Zimmerman's (2002) three-phase model. This support flow can be described as an interconnected cycle, as illustrated in Figure 3.

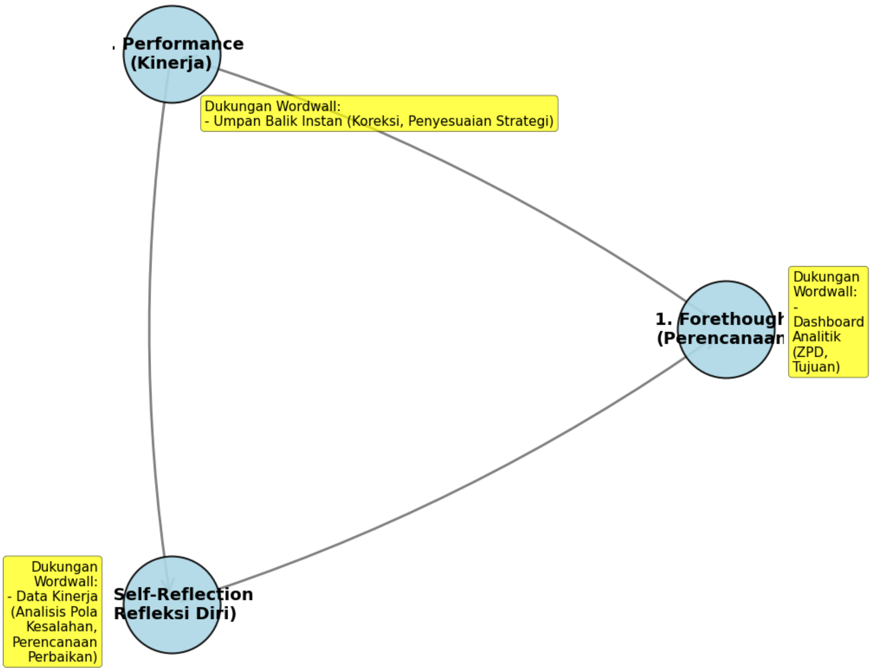

Figure 3: Student Self-Regulation Cycle with Wordwall Instant Feedback

In the Forethought *Phase*, Wordwall's analytics dashboard helps students identify their developmental zones (e.g., areas of grammar that are often incorrect), guiding more realistic and focused personal goal setting. The Performance Phase is directly supported by the instant feedback feature. When students make mistakes, for example in the use of *tenses* or sentence structures, the system provides corrections or hints in *real-time*, allowing for instant correction and adjustment of strategies, where this feedback does not simply indicate true/wrong answers, but often includes brief explanations. In the *Self-Reflection Phase*, the Wordwall's ability to collect and display performance data facilitates *Error Pattern Analysis*, encourages students to reflect on their recurring error patterns, understand the root causes, and plan corrective strategies for future activities, so that this reflection then informs the Planning Phase for the learning cycle Next, creating *a continuous learning* loop.

Empirical data from the implementation on 240 EFL students reinforce this model (Cho, 2024). As many as 89% of students reported actively trying to correct their mistakes as soon as they received instant feedback during the activity. In addition, 64% of students showed improved ability to identify their own recurring error patterns after a few sessions. Even more encouragingly, 37% of students proactively revised their study strategies (e.g., practicing more specific types of questions, looking for additional resources) based on recommendations or insights gleaned from *Wordwall's analytics* dashboard.

4. Cognitive Sequencing in Practice

This learning framework emphasizes the importance of progressive sequencing to build a deep understanding of persuasive writing materials. The implementation of this framework is designed through a learning chain that begins at the Remember level using the Flashcards template, aiming to activate and strengthen students' memory of key rhetorical terms such as ethos (credibility), pathos (emotion), and logos (logic).

Once this foundation is established, learning moves to the Analyze level using the modified Group Sort template. At this stage, students analyze real persuasive texts (e.g., advertisements or short speeches) to identify and group the specific rhetorical strategies that the author uses, based on the type of comparison (ethos, pathos, logos) and their effectiveness in context.

The next stage reaches the Evaluate level through a modified Gameshow Quiz template. Students are not only challenged to choose the strongest rhetorical technique from several options in a given scenario, but must also provide an in-depth written critical justification, analyzing why certain techniques are more effective than others based on the audience and objectives.

This learning chain reaches its peak at the Create level with the Open the Box template. Here, students are challenged to design an original persuasive speech or a short advertising script that intentionally incorporates the target rhetorical techniques that have been learned in the previous stages.

The results of the implementation of this progressive learning chain are very positive. The students' performance analysis showed a significant improvement compared to the previous approach that was less cognitively structured, namely 28% in the coherence aspect of writing (logical flow and presentation of arguments) and an increase of 34% in the aspect of using appropriate and effective rhetorical techniques in their persuasive writing. This improvement can be clearly seen in Figure 4.

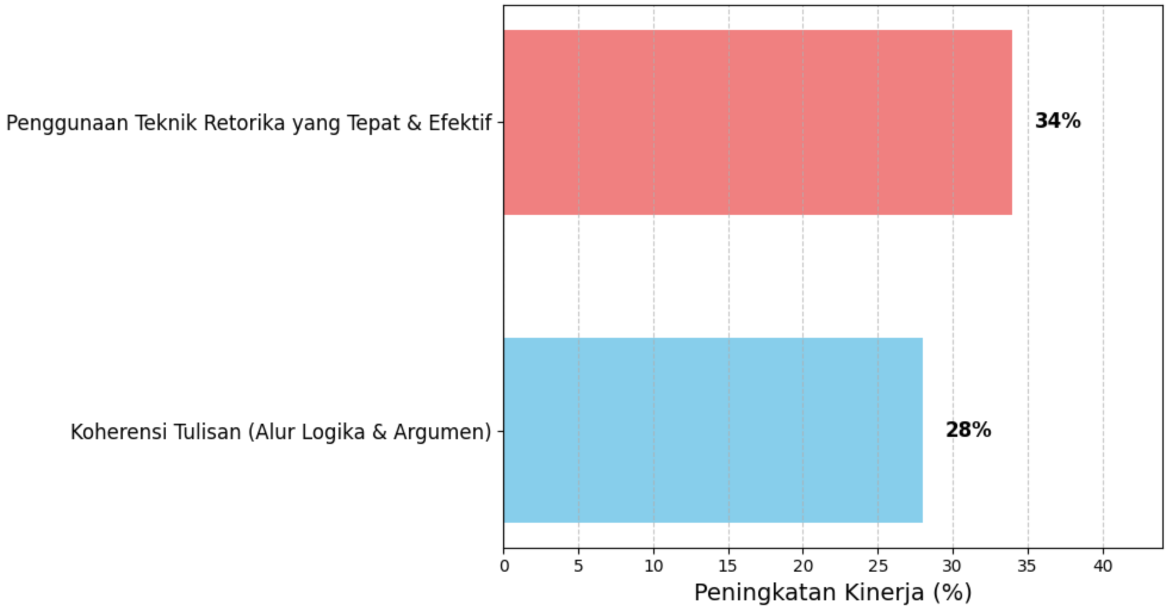

Figure 4. Student Performance Improvement in Persuasive Writing Following Progressive Learning Chain Implementation

DISCUSSION

1. Transforming the Teacher's Role: From *Tool User* to *Cognitive Designer*

The proposed Bloom-Wordwall mapping framework is not only about activities, but fundamentally repositions the professional role of teachers in the digital learning ecosystem. This framework empowers teachers to transform from passive *tool users* to active and reflective *cognitive designers* (McKenney & Reeves, 2023). This transformation is realized through three key principles. First, *Cognitive Equity* emphasizes the teacher's responsibility to ensure that all students, regardless of their initial ability profile, have meaningful access and adequate support to engage in HOTS activities, meaning providing different *scaffolding* or additional modifications for students in need. Second, *Hybrid Pedagogy* emphasizes that technologies such as Wordwall should serve as *enablers* or catalysts for deep cognitive processes, not as a substitute for essential pedagogical interactions or critical thinking, where technology is a tool, not an end. Third, the Pedagogical Agency *places the teacher as the primary curator of the learning experience, where the teacher, with a deep understanding of* *the student and the learning objectives, uses this evidence-based framework to deliberately select, modify, and curate the most appropriate digital activities.*

A practical example taken from a teacher in Jakarta illustrates this transformation clearly. Rather than using the standard *Wordsearch template* for the Remember activity alone, the teacher creatively modified it into *an Analyze* activity by adding a critical instruction: "Find a minimum of five adjectives used in this descriptive text, then analyze and explain in writing why the author likely chose that specific adjective and how the word was chosen contributes to forming a certain image or impression of the object described." These modifications turn mechanical activity into analytical challenges that encourage a deep understanding of word choice and its impact.

2. Operational Model for Practitioners

To facilitate adoption by teachers, this framework is operationalized into a systematic four-step implementation model, equipped with concrete supporting tools, as illustrated in Figure 5.

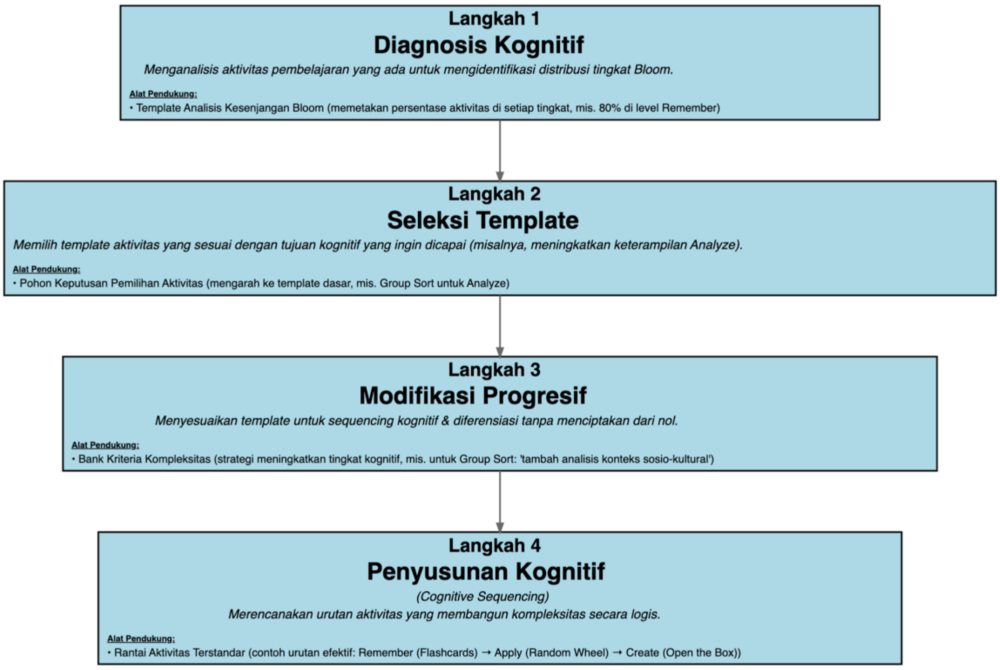

Figure 5: 4-Step Operational Model for EFL/ESL Teachers

The first step is Cognitive Diagnosis, where teachers analyze existing learning activities to identify Bloom level distributions, assisted by supporting tools such as the Bloom Gap Analysis Template that helps teachers visually map the percentage of activity at each level, for example finding that 80% of the activity is currently at *the Remember* level. The second step is Template Selection. Based on the cognitive goals they want to achieve (for example, improving *Analyze* skills), teachers use the Activity Selection Decision Tree provided in the framework. This decision tree directs teachers to consider factors such as the teaching material, the level of student readiness, and the specific goal to choose the most appropriate basic template, for example choosing *Group Sort* for *the Analyze* objective. The third step is Progressive Modification. Teachers don't need to create from scratch, but take advantage of the Complexity Criteria Bank that is part of the framework. The bank contains examples of strategies to improve the cognitive level of each *template*, for example for *Group Sort* modifications, the bank suggests adding analysis criteria such as "add analysis of socio-cultural contexts that influence the author's choice of language." The fourth step is Cognitive *Sequencing*. The teacher plots a sequence of activities that logically construct complexity, with the Standardized Activity Chain in the framework providing examples of effective sequences, such as *Remember* (*Technical vocabulary flashcards*) → *Apply* (*Random Wheel* to apply vocabulary in explanatory sentences) → *Create* (*Open the Box* to design a short presentation using the target vocabulary and structure). Each step is supported by tools and examples that make it easy to execute in real classes.

3. Integration with Modern Learning Theory

The Bloom-Wordwall framework does not stand alone, but is firmly integrated with the principles of modern learning theory. Cognitive Load Management *according to Sweller (2021) is a key consideration in activity design and* sequencing*, where complex HOTS activities, such as analyzing long texts or creating original language products, are broken down into smaller, structured stages (*chunking*) to avoid counterproductive cognitive overload.* Digital Scaffolding (*Digital Scaffolding*), as conceptualized by Zhang and Quintana (2022), is realized through the utilization of Wordwall's adaptive features, where feedback and difficulty levels can be dynamically adjusted based on student performance recorded by the system, providing the right support at the right time. Metacognitive Triggers are another crucial element. Based on the Zimmerman and Moylan (2020) model, the Wordwall analytics dashboard is designed not only for teachers, but also for students, where visual data on strengths, weaknesses, and error patterns displayed in the *dashboard* serves as a powerful trigger for students' critical reflection on their own learning process, encouraging them to evaluate strategies and plan improvements. This multidisciplinary integration ensures the framework not only enhances language-specific cognitive skills but also supports the development of independent and reflective learners.

4. Implementation Challenges and Solutions

While promising, the implementation of this framework faces a number of challenges that need to be acknowledged and addressed. The main challenge is the Teacher Cognitive Load, where designing meaningful HOTS-based activities requires time and deep thought, which can be burdensome for already busy teachers. The pragmatic solution is the provision of a *Cognitive Design Toolkit* that contains modified *templates*, sample *sequenced activity plans*, and rapid modification guidelines, as well as the necessary institutional support in the form of *microcredential* training that are focused and practical, recognize and give professional development credit for these new cognitive design skills.

The second challenge is Technical Limitations, either related to device access, internet connectivity, or limitations of the free version of Wordwall. The solution is to create and provide a Curated Activity Repository containing high-quality HOTS activities that have been pre-created and tested by other teachers, reducing the need to create from scratch, and institutions can support through partnerships with platform developers (such as Wordwall) to provide access to premium features or develop custom versions for educational needs. The third challenge is the Pedagogical Resistance of teachers who may be comfortable with traditional methods or doubt the effectiveness of the new approach. Building a Community of Practitioners through *lesson studies* or collaborative working groups where teachers can share experiences, challenges, and successes is an effective solution, and institutions can provide tangible incentives such as temporary teaching load reductions or formal recognition for the development of innovative teaching materials based on these frameworks. The final challenge is the HOTS Assessment. Measuring skills such as analysis, evaluation, and creation in a digital context requires a new approach to assessment. The solution is the development of the Bloom-CEFR Integrative Rubric that explicitly links cognitive performance criteria to language proficiency levels, as well as institutional support in the form of investment in AI-based Automated Assessment Systems that can help assess certain aspects (e.g., sentence structure complexity, vocabulary variations) in students' creative products, although the final assessment still requires a human touch.

CONCLUSION

The Bloom-Wordwall mapping framework developed in this article provides the first integrative model that effectively bridges classical cognitive theory (revised version of Bloom's Taxonomy), modern learning principles (*Self-Regulated Learning*), and practical technological innovations (Wordwall platforms). The main contribution of this framework is threefold: first, it provides an evidence-based strategy to proactively address the predominance of low-level thinking activities (LOTS) that are still prevalent in EFL digital learning, where through targeted design modifications and empirical validation, the framework shows that most *of the templates* Wordwall (78%) has the potential to be driven to reach higher cognitive levels (HOTS); Second, the framework provides clear and practical operational guidance for teachers to undertake a fundamental transformation from *a tool-driven approach* to *a pedagogy-driven design*, including concrete tools such as mapping matrices, decision trees, and activity chain examples; and third, the framework shows how to optimize platform-specific technical mechanisms, particularly instant feedback and analytics, which are often underutilized, into powerful tools to empower students' metacognition and learning independence, with empirical evidence showing a positive impact on students' self-monitoring and reflection abilities.

Based on the findings and discussions, several strategic implementation recommendations were proposed. Educational institutions are advised to adopt and integrate Digital *Taxonomic Literacy* as a core component in pre-service and in-service teacher training programs. Developers of educational platforms such as Wordwall are encouraged to provide cognitive taxonomy-based activity filtering features directly within their platforms, making it easier for teachers to find activities that match the desired level of cognitive goals. To validate the long-term impact, longitudinal research is urgently needed to explore how the implementation of this framework affects the development of students' productive competencies (speaking, writing) on an ongoing basis.

Important further research directions to explore cover several areas. The development of an *AI-based recommendation engine* that can automatically suggest Wordwall activities or modifications based on students' individual cognitive profiles and learning goals is a potential breakthrough. Comparative studies are also needed to evaluate the effectiveness of this framework in a variety of different socio-cultural contexts, identifying the contextual factors that influence its success. In addition, the exploration of the integration of affective dimensions (such as motivation, language anxiety, engagement) into the design of cognitive taxonomy-based activities becomes an area of interest, creating a more holistic approach.

In conclusion, although this study focuses primarily on the cognitive realm and has not comprehensively investigated the profound impact on affective variables, the proposed Bloom-Wordwall mapping framework opens a promising path towards a more balanced and meaningful English digital learning ecosystem. The ecosystem aims to simultaneously strengthen students' language cognitive competencies and foster their learning independence as lifelong learners, harnessing the full potential of technology for deep and sustainable pedagogical purposes.

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