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A comparative analysis of gamification tools in enhancing content retention in CLIL-based EFL classrooms

Abstract. In the digital age, integrating gamification into Content and Language Integrated Learning (CLIL) has become crucial for engaging EFL learners and enhancing pedagogical outcomes. This study aims to evaluate comparatively the impact of three widely used gamification platforms – Kahoot, Genially, and Quizizz – on content retention and learner experiences among university-level EFL students. Employing a quasi-experimental, mixed-methods design, 53 participants were assigned to one of the three tool conditions and assessed through retention tests, perception questionnaires, focus-group interviews, and structured classroom observations. Quantitative analysis via one-way ANOVA revealed a significant effect of tool type on retention scores ($F(2.50) = 5.67$, $p = .005$, $\eta^2 = .115$). Post hoc comparisons showed Quizizz users achieved the highest mean retention ($M = 85.6$, $SD = 5.9$), significantly outperforming Genially ($M = 78.2$, $SD = 7.4$; $p = .004$), with Kahoot ($M = 82.5$, $SD = 6.2$) yielding intermediate results. Qualitative findings indicated that Quizizz's self-paced format and immediate corrective feedback reduced anxiety, fostered autonomy, and promoted metacognitive reflection. Kahoot's competitive, time-pressured rounds drove high short-term engagement but sometimes imposed cognitive load that impeded deeper comprehension. Genially's rich multimedia interface enhanced initial motivation and visual immersion, yet learners required additional scaffolding and follow-up retrieval exercises to consolidate learning. These results underscore that design features – pacing controls, feedback immediacy, and interface complexity – must be strategically aligned with instructional goals to maximise both cognitive and affective outcomes. Educators and curriculum designers can apply these insights to select or combine gamified tools in CLIL settings, tailoring activities to balance engagement, comprehension, and long-term retention. The practical value of this research lies in its applicability for EFL instructors, curriculum designers, and educational technologists seeking evidence-based guidance on selecting and integrating gamified tools to enhance content retention in CLIL-based university language courses

Keywords: digital tools; Quizizz; Kahoot; Genially; language education; learner engagement

INTRODUCTION

In globalised world, mastering English as a Foreign Language (EFL) is crucial for academic success, professional development, and intercultural communication. However, traditional EFL classrooms often struggle with low student motivation and limited retention of knowledge. This has created a pressing need for innovative instructional strategies that can boost engagement and improve learning outcomes. One such approach gaining considerable attention is gamification – the application of game design elements in non-game contexts. By incorporating features such as points, challenges, and interactive tasks, gamification is increasingly being adopted in educational settings to enhance motivation, participation, and knowledge retention among EFL learners.

Recent studies have explored the role of gamification in enhancing learning outcomes in EFL and CLIL contexts. A.J. Arip & H. Hashim (2024) conducted a systematic review of 28 studies published between 2020 and 2024,

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concluding that game elements significantly improve student motivation, engagement, language proficiency, and critical thinking. Similarly, S. Zhang & Z. Hasim (2023), in their work published in *Frontiers in Psychology*, emphasised that gamification supports both English language development and emotional engagement, particularly through the fr ameworks of Self-Determination Theory and Flow Theory. N.K. Kalleny (2020) highlighted the widespread use of Kahoot!, noting that its more than 30 million users benefit from enhanced formative assessment practices, increased motivation, and stronger classroom interaction. Investigating its impact in vocational education, P. Sassmannová (2023) found that Kahoot! promotes memory retention and student participation. In a CLIL setting, T. Vo *et al*. (2023) integrated both Genially and Kahoot! in higher education, revealing notable improvements in learner motivation, language skills, comprehension of subject content, and retention. A variety of digital tools have been employed to gamify EFL instruction, with platforms like Kahoot, Genially, Quizizz, and Socrative among the most frequently studied. For instance, T. Vo *et al*. (2023) found that combining Genially and Kahoot in a CLIL framework significantly enhanced student motivation, language proficiency, and comprehension of subject-specific content. In a separate study, the sustained use of multiple gamified platforms over an eight-week period – Quizizz, Kahoot, Genially, and Socrative – was linked to improved communication skills and knowledge retention among university EFL students. Emerging technologies such as Augmented Reality (AR) have also been tested for gamification in EFL. P. Cabrera-Solano (2022) demonstrated that Genially supports differentiated instruction, effectively enhancing a range of language skills including grammar, vocabulary, reading, writing, speaking, and listening. Finally, I. Lopatynska *et al*. (2024) showed that incorporating games in CLIL instruction significantly boosts student motivation and fosters greater cultural awareness. Collectively, these findings highlight the growing evidence base supporting gamification as a powerful pedagogical tool in EFL and CLIL education.

Despite evidence supporting individual gamification tools, there remains a lack of comparative research on their relative strengths and limitations – especially regarding subject-content retention in CLIL-based EFL instruction. Existing literature does not adequately compare tools like Kahoot! and Genially, alone or combined, across critical pedagogical outcomes such as memory and engagement. F. Çelik & C.Y. Ersanlı (2023) conducted a quasi-experimental study showing that AR-based mobile apps not only improved language performance but also cultivated more positive learning attitudes among high school students. Despite promising results across these tools, few studies have directly compared their effectiveness. One exception is W. Ibad *et al*. (2023), who compared Kahoot, Quizizz, and Wordwall in EFL reading instruction, concluding that Quizizz yielded the most substantial learning gains. However, a significant gap remains: few investigations have examined the relative impact of different gamified tools on content retention in CLIL-based EFL classrooms. This lack of comparative evidence limits understanding of which tools are most effective for sustained knowledge acquisition, a critical factor in designing evidence-informed instruction.

The aim of this study was to comparatively analyse the effects of different gamified tools on retention of subject-specific content within EFL-CLIL classrooms.

MATERIALS AND METHODS

This study relied on a comparative quasi-experimental mixed-methods research design, combining quantitative and qualitative approaches to evaluate the effectiveness of various gamification tools – namely Kahoot, Genially, and Quizizz – in enhancing content retention among EFL learners within a CLIL framework. A mixed-methods approach, as supported by J.W. Creswell & J.D. Creswell (2022), allowed for both numerical analysis of learning outcomes and rich, contextual insights into learner experiences and perceptions, yielding a triangulated understanding of how different gamification tools affect retention in content-based language instruction. The primary dependent variable was content retention, operationalised through pre- and post-intervention tests aligned with the CLIL subject matter. Secondary variables included student motivation, engagement, participation, and perceived tool usability, captured via perception questionnaires, structured observations, and focus group discussions. These qualitative indicators complemented the quantitative data by revealing learner attitudes, behavioural patterns, and instructional dynamics within each gamified environment. The independent variable was the type of gamification tool used in instruction, with three levels: Kahoot, Genially, and Quizizz.

The study was conducted at the State University of Trade and Economics and involved 53 undergraduate students (aged between 18 and 22) majoring in Law, Economics, and International Relations and Economic Diplomacy. Participants were enrolled in three separate EFL course sections that implemented the CLIL methodology. Each academic group was treated as a distinct cohort and was randomly assigned one of the three gamification tools – Kahoot, Genially, or Quizizz – as the primary instructional aid over a 12-week period in the first semester of the 2024-2025 academic year. All three groups were taught by the same instructor – the author of this study – to ensure consistency in pedagogical delivery, minimise instructor-related bias, and maintain uniform implementation of the CLIL framework and gamification strategies. Participants had intermediate language proficiency (B1-B2 level) based on the Common European Framework of Reference for Languages (CEFR) (Council of Europe, 2020). All groups followed the same curriculum (discipline: Foreign language of speciality (English)), taught by instructors trained in CLIL pedagogy, ensuring consistency in content delivery across conditions.

Quantitative data were collected through pre- and post-intervention content retention tests, specifically designed around CLIL-integrated modules in history and environmental science. These tests, identical in content across all three groups, assessed learners' comprehension of subject-specific material in English. Two types of retention were measured: immediate retention, administered directly after instructional sessions, and delayed retention, assessed four weeks after the intervention to evaluate longer-term content recall. The dependent variable was content retention, while the independent variable was the gamification tool used (Kahoot, Genially, or Quizizz). Qualitative data focused on secondary variables such as student motivation, engagement, perceived tool usability, and overall learning experience. These were collected through:

1. Student perception questionnaires consisting of 24 items, including 18 five-point Likert-scale statements and 6 open-ended questions. The Likert-scale items targeted dimensions such as intrinsic motivation, perceived usefulness, ease of use, and engagement during gamified instruction. Open-ended responses allowed students to elaborate on strengths, challenges, and personal preferences regarding the tools used. The questionnaire underwent expert review by three specialists in EFL pedagogy and educational technology, followed by a pilot study with 15 students. Reliability was confirmed with a Cronbach's alpha of 0.91, indicating strong internal consistency.

2. Focus group interviews with 4-6 participants per group, guided by a semi-structured protocol addressing user experience, engagement, and instructional effectiveness. Each session lasted approximately 25-40 minutes and was conducted online via Zoom. Transcripts were thematically analysed to extract recurring perceptions across the different gamification conditions.

3. Structured classroom observations, documented using a standardised checklist featuring 12 binary items (yes/no) covering learner behaviours such as active participation, peer interaction, responsiveness to feedback, and attentiveness. Observers were trained to ensure inter-rater reliability, which reached 87%.

Quantitative data were analysed using Jamovi software (Version 2.5.5). A one-way ANOVA was conducted to compare content retention test scores across the three experimental groups. Variance was partitioned using Sum of Squares (SS): "Between Groups" reflects variance attributable to differences among the tools, "Within Groups" captures individual variability, and "Total" represents the overall variance. Degrees of freedom (*df*) indicate the number of values free to vary in the analysis. Mean Squares (MS) are obtained by dividing each SS by its corresponding df, yielding the average variance attributable to and within groups. The F-ratio – computed as the ratio of between-group variance to within-group variance – quantifies the relative magnitude of group differences, with larger values suggesting more pronounced between-group effects. Finally, the p-value falls below the conventional significance threshold, indicating that retention differs significantly among the three tools. ANOVA was followed by Tukey's post-hoc tests to identify statistically significant pairwise differences. Effect sizes were calculated using Eta-squared (η^2). Descriptive statistics provided a comprehensive overview of content retention scores across different groups. The sample size (*N*) indicated the number of participants in each group, reflecting the amount of data available for analysis. The *Mean* represented the average retention score within each group, serving as a measure of central tendency that summarised typical performance. The Standard Deviation *(SD*) quantified the spread or variability of scores around the mean, with larger values indicating greater dispersion in individual performances within the group. The Standard Error (*SE*) measured the precision of the sample mean as an estimate of the true population mean, with smaller values suggesting more reliable estimates. Together, these statistics allowed researchers to compare not only the average performance across groups but also the consistency and reliability of those performance measures. Qualitative data from focus groups and open responses were subjected to thematic analysis, identifying recurring themes related to user experience, motivation, and tool design features. Inter-rater reliability for coding exceeded 85%, ensuring consistency.

This study adhered to established ethical standards for educational research involving human participants. Informed consent was obtained from all students after they received full information about the study's objectives, procedures, voluntary nature, and their right to withdraw at any time without penalty. Confidentiality and privacy were ensured through anonymised data collection, secure data storage, and adherence to institutional data protection policies. The study protocol included comprehensive measures to safeguard participants' privacy and confidentiality – such as de-identifying participant data, encrypting digital files, and limiting access to master code lists – in accordance with IRB guidelines requiring secure handling of identifiable information (University of Nevada, 2025).

RESULTS

The results are presented in two parts: first, quantitative findings based on ANOVA and effect size analysis of retention scores, followed by qualitative insights from thematic analysis of focus group and questionnaire data. A one-way analysis of variance (ANOVA), presented in Table 1, was conducted to compare the effectiveness of three gamification tools – Kahoot, Genially, and Quizizz – on content retention scores among EFL learners in a CLIL-based instructional setting. The analysis revealed a statistically significant difference in mean retention scores among the groups, $F(2.50) = 5.67$, $p = .005$, $\eta^2 = .115$, indicating a medium-to-large effect size according to Cohen's guidelines. This suggests that the type of gamification tool used had a meaningful impact on students' ability to retain subject-specific content.

Table 1. One-way ANOVA summary table for content retention scores by gamification tool

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	528.4	2	264.2	5.67	.005
Within Groups	4053.2	50	46.6	-	-
Total	4581.6	52	-	-	-

Source: developed by the author

Descriptive statistics, provided in Table 2, indicated that participants in the Quizizz group ($n = 18$) achieved the highest mean retention score ($M = 85.6$, $SD = 5.9$), followed by the Kahoot group ($n = 18$, $M = 82.5$, $SD = 6.2$), and the Genially group ($n = 17$, $M = 78.2$, $SD = 7.4$). Post-hoc analyses using Tukey's Honest Significant Difference (HSD) test revealed that the Quizizz group significantly outperformed the Genially group ($p = .004$), while the difference between the Kahoot and Genially groups approached significance ($p = .048$). No significant difference was observed between the Kahoot and Quizizz groups ($p = .210$), although the Quizizz group demonstrated a modestly higher mean score.

Table 2. Descriptive statistics for content retention scores

Group	*N*	*Mean*	*SD*	*SE*
Kahoot	18	82.5	6.2	1.46
Genially	17	78.2	7.4	1.79
Quizizz	18	85.6	5.9	1.39

Source: developed by the author

These findings, summarised in Table 1 and Table 2, suggest that while all three tools support learning within a CLIL framework, Quizizz may be particularly effective in enhancing long-term content retention. Its self-paced format, combined with immediate feedback and diverse question types, may contribute to deeper cognitive processing. In contrast, Genially, despite its interactive and visually engaging nature, might require more instructional scaffolding to achieve comparable retention outcomes.

The analysis of qualitative data provided deeper insight into secondary variables, including student motivation, engagement, perceived tool usability, and overall learning experience associated with the use of Kahoot, Genially, and Quizizz in CLIL-based EFL instruction. Thematic analysis revealed several converging and diverging patterns across the tools, enriching the interpretation of the quantitative findings. Students using Quizizz consistently highlighted its self-paced structure and instant feedback as key factors contributing to their intrinsic motivation and sustained engagement. Participants described the interface as "user-friendly" and "visually appealing," and appreciated the ability to revisit questions and track progress in real time. Focus group data indicated that Quizizz's format reduced performance anxiety by allowing learners to proceed at their own speed, thereby enhancing both engagement and comprehension. Observational data supported these claims, showing high levels of participation and peer interaction, particularly during collaborative quiz rounds.

In contrast, sampled student-users of Kahoot emphasised the tool's competitive and gamified atmosphere as highly motivating. The leaderboard feature and time-based scoring were frequently cited in open-ended responses as "exciting" and "energising." However, several students noted that the rapid pace sometimes led to stress and decreased focus on content comprehension. Despite this, classroom observations recorded consistent high energy levels and widespread active participation, confirming Kahoot's strength in boosting immediate engagement.

Participants exposed to Genially expressed appreciation for its multimedia-rich design and interactivity, which supported visual learning and made lessons more immersive. However, responses across all qualitative sources revealed mixed perceptions about its usability. While some students praised the creative and exploratory features, others reported difficulty navigating complex interfaces or technical delays that interrupted the learning flow. Genially was often seen as better suited for asynchronous activities or for supplementing rather than driving real-time classroom engagement.

Overall, the data suggest that Quizizz may offer the most balanced tool for sustained motivation, usability, and cognitive engagement, especially in formative assessment settings. Kahoot excels in fostering short-term excitement and classroom dynamism, but may require pacing adjustments for deeper learning. Genially offers a valuable platform for content delivery and visual reinforcement, yet may demand greater digital literacy and instructional scaffolding. These nuanced insights highlight the importance of aligning gamification tools not only with instructional goals but also with learners' technological preferences and cognitive needs.

DISCUSSION

This study breaks new ground by combining quantitative and qualitative methods to compare the learning effects of three gamification tools – Kahoot, Genially, and Quizizz – within a CLIL-based EFL classroom. The data reveal tool-specific differences not only in retention out-

comes but also in learner perceptions, motivation, and cognitive engagement. By triangulating statistical evidence with student-reported experiences and observed behaviours, the study provides a nuanced understanding of how design features like pacing, feedback, and interface usability shape the educational impact of gamified learning environments. These outcomes resonate strongly with the broader literature. S. Zhang & Z. Hasim (2023) emphasised that "timely feedback and user control" are linchpins of digital retention, and data confirm that giving learners autonomy over pacing fosters stronger recall. At the same time, Kahoot's timed rounds mirror A. Alawadhi & E.A.S. Abu-Ayyash's (2021) warning that too much pressure can overload working memory, a concern echoed by F. Çelik & C.Y. Ersanlı (2022) in their quasi-experimental study of speed-focused EFL games. Meanwhile, Genially's visual strengths – lauded by P. Cabrera-Solano (2022) – must be bolstered with immediate retrieval tasks, in line with M. Enríquez (2020), to translate engagement into lasting learning.

Findings align with a growing body of research emphasising the strategic value of gamification in CLIL-based EFL instruction. Prior studies have shown that integrating game-design features – such as points, leaderboards, and storytelling – into language learning environments enhances motivation, engagement, and content retention (Nozhovnik *et al.*, 2023; Zhang & Hasim, 2023). This is particularly relevant in CLIL contexts, which, as D. Marsh (2002) outlined in his foundational framework, aim to integrate both subject content and language acquisition in a cognitively demanding environment. Scholars such as C.J. Lai (2024), T. Vo *et al*. (2024) and J.J. Achivida (2025) have demonstrated that well-designed gamification strategies can effectively scaffold these demands – a conclusion that is corroborated by results.

From a pedagogical perspective, these insights suggest that the mere presence of gamification is not enough; rather, educators must thoughtfully match tool features to learning goals. In practice, this might mean using Quizizz to anchor key vocabulary or grammar points, supplementing Genially presentations with brief in-class quizzes, and reserving Kahoot for lively review sessions when rapid recall is the primary aim. Equally important is preparing both teachers and students: training instructors to recognise signs of cognitive overload, and guiding learners in managing self-paced activities to optimise metacognitive benefits. For example, D. Coyle (2007) emphasised that effective CLIL pedagogy requires cognitively engaging, well-structured tasks that simultaneously promote language and content mastery. Quizizz, with its capacity for metacognitive reflection and autonomy-supportive features, aligns well with these CLIL principles. In contrast, while Kahoot effectively boosts engagement, its reliance on speed and competition may not always support the deeper cognitive demands of CLIL, echoing M. Gebbels (2018) caution that such tools must be adapted to challenge learners meaningfully rather than superficially entertain. Furthermore, the formative potential of gamification tools like Kahoot has been positively documented in vocabulary learning contexts. A. Hamedi *et al*. (2022) found that using Kahoot significantly improved vocabulary knowledge and reduced learner burnout among intermediate EFL students. However, their findings also caution that tool effectiveness depends on how formative assessment is integrated into broader instructional design. Findings support this nuance: Kahoot is beneficial for short-term review, but without pacing adjustments or content scaffolding, it may not meet the cognitive load needs of CLIL students engaged with complex subject matter.

When situated within the broader landscape of gamification research, findings affirm and refine prior claims. I. Lopatynska *et al*. (2024) examined the integration of both Genially and Kahoot in a CLIL course and concluded that while the tools were effective in enhancing engagement and subject comprehension, their individual contributions to retention were not directly compared. Study fills this gap by explicitly contrasting tool-specific outcomes and identifying design factors – such as pacing, feedback immediacy, and competitive pressure – that mediate the effects of gamification on cognitive outcomes. W. Ibad *et al*. (2023) conducted a direct comparison of Quizizz, Kahoot, and Wordwall in EFL reading classes, concluding that Quizizz was most effective for retention. Findings reinforce their results, especially in highlighting how Quizizz's adaptive pace and immediate feedback help students self-correct in real-time and reduce working memory overload. Moreover, this study resonates with pedagogical principles from Self-Determination Theory (SDT), which emphasises autonomy, competence, and relatedness as key drivers of intrinsic motivation. Quizizz's format appears to satisfy these needs by allowing students to regulate their own learning pace, receive competence-affirming feedback, and compete in a low-pressure setting – conditions not fully met by Kahoot or Genially in this study's design.

While all three tools can enhance engagement, their cognitive effects vary based on how their features align with instructional goals. For instance, Quizizz is best suited for reinforcing grammar rules, terminology, or complex concepts that benefit from reflective processing. Kahoot may be strategically used for quick reviews or energising quiz sessions but should be moderated to avoid overwhelming learners, especially in content-heavy lessons. Genially, with its strong visual appeal, serves well as a pre-instructional tool or as part of a flipped classroom strategy, provided that post-lesson retrieval tasks are integrated to aid consolidation. Second, instructors must consider learner differences such as digital literacy, metacognitive awareness, and anxiety sensitivity when selecting gamified tools. As qualitative data suggest, students with lower tech confidence or slower processing speed may feel disadvantaged by fast-paced tools like Kahoot, whereas more autonomous learners thrive in self-paced environments like Quizizz. Therefore, blended or hybrid gamification models that offer both visual scaffolding (e.g., Genially) and retrieval practice (e.g., Quizizz) may offer the most inclusive and pedagogically

sound approach. Finally, teacher training is essential. Instructors need to be able to diagnose cognitive overload, adapt pacing, and guide students in using digital tools for reflection rather than passive interaction (Mykhailenko, 2024). As digital tools become more prevalent in language education, pedagogical competence must evolve to ensure that technology serves learning, not the reverse.

In conclusion, the Discussion highlights how the intersection of gamification design, learner needs, and instructional context shapes educational outcomes in CLIL-based EFL environments. This study contributes to both theory and practice by specifying when and why certain tools outperform others, offering educators a roadmap for intentional, evidence-based technology integration.

CONCLUSIONS

This study offered original empirical insights into CLIL-based EFL education by comparatively analysing the effectiveness of three popular gamification tools – Kahoot, Genially, and Quizizz – on students' content retention and learning experiences. Quantitative results from a one-way ANOVA ($F(2.50) = 5.67$, $p = .005$, $\eta^2 = .115$) indicated a medium-to-large effect size for the type of tool used, with Quizizz users achieving the highest mean score ($M = 85.6$, $SD = 5.9$), significantly outperforming Genially users ($M = 78.2$, $SD = 7.4$; $p = .004$), while the Kahoot–Genially comparison approached significance ($M = 82.5$, $SD = 6.2$; $p = .048$). Qualitative findings, based on thematic analysis of student questionnaires, focus group discussions, and classroom observations, revealed distinct patterns across the tools. Quizizz's self-paced structure and instant feedback minimised anxiety, fostered learner autonomy, and encouraged reflective learning – factors likely contributing to its superior retention outcomes. Kahoot, with its competitive, fast-paced format and real-time leaderboard, effectively heightened engagement and participation, though it sometimes induced cognitive overload that compromised deeper content processing.

Genially, characterised by its rich visual and interactive design, supported initial comprehension and classroom immersion; however, many students needed additional scaffolding and retrieval practice to convert this visual appeal into long-term retention. These findings highlight the importance of aligning specific design features – such as pacing, feedback immediacy, and interface complexity – with pedagogical goals and learner characteristics. Quizizz is best suited for promoting sustained knowledge retention, Kahoot is ideal for energising formative assessment moments, and Genially excels as an engaging introductory tool when paired with structured follow-up activities. By clarifying how cognitive load, motivation, and usability interact in gamified CLIL environments, this study provides language educators with evidence-based guidelines for selecting digital tools and designing effective, learner-centered instruction. Future research should use larger, more diverse samples, longitudinal designs, and explore hybrid models and learner differences – such as digital literacy – to refine gamification strategies in CLIL-based instruction.

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CONFLICT OF INTEREST

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