

Digital Classroom Management and Learning Innovation: The Synergy of Kahoot and Project-Based Learning In Language Instruction

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Abstract.

Effective digital classroom management and pedagogical innovation are pivotal in addressing student passivity and optimizing learning outcomes in modern education. This study investigates the management and pedagogical synergy of integrating a gamified digital tool (Kahoot) with Project-Based Learning (PjBL) in managing classroom dynamics, student engagement, and grammatical competence (focusing on conditional sentence type 1). A sequential explanatory mixed-methods design was employed, involving 68 eleventh-grade Tahfidz Program students at SMA Swasta Budi Agung Medan selected through total sampling. Quantitative data obtained from pre-test and post-test scores were analyzed using independent sample t-tests in SPSS, while qualitative data concerning classroom management dynamics and multidimensional engagement were gathered through structured observations and analyzed using the interactive model of Miles et al. (2014). The findings revealed that the experimental class achieved a significant increase in mean score from 65 to 72, whereas the control class showed a slight decline from 62 to 60. The independent sample t-test yielded a significant value of $p = 0.004 < 0.05$, confirming a statistically significant impact of the Kahoot-PjBL management model. Qualitatively, the experimental class exhibited superior behavioral compliance, cognitive participation, and emotional engagement compared to the conventionally managed control class. The study concludes that the strategic synergy of Kahoot and PjBL offers an effective framework for digital classroom management, transforming passive instructional environments into interactive, data-informed, and student-centered learning ecosystems.

Keywords: Digital Classroom Management, Learning Innovation, Project-Based Learning and Student Engagement.

I. INTRODUCTION

Classroom management in foreign language instruction faces substantial challenges, primarily stemming from rigid instructional designs and conventional delivery methods that frequently lead to student disengagement and low academic achievement. In English as a Foreign Language (EFL), contexts mastering grammatical structures such as conditional sentences—requires active practice and contextual application (Aldubayyan & Aljebreen, 2025; Nurlaela & Nawir, 2020). However, traditional teacher-centered classroom management often isolates grammatical rules from communicative practice, fostering learning anxiety and cognitive fatigue among learners.

Preliminary observations in the classroom indicate that low grammar mastery is deeply rooted in instructional management deficits: students remain passive recipients, formative feedback is delayed, and classroom interactions lack structured collaboration. To overcome these challenges, educators acting as instructional managers must innovate by leveraging digital pedagogical tools and active learning models.

The integration of digital gamification platforms, such as Kahoot, with collaborative instructional models like Project-Based Learning (PjBL) presents a strategic approach to classroom management innovation. Kahoot provides a game-based management mechanism that facilitates real-time formative assessment, immediate diagnostic feedback, and structured time management, thereby boosting learner motivation and focus (Alawiyah et al., 2024; Özdemir, 2025). Concurrently, PjBL establishes an authentic collaborative learning environment where students manage tasks, solve real-world problems, and apply target structures meaningfully (Nurlely, 2024).

While prior studies have examined Kahoot and PjBL separately as instructional media or methods, limited research has investigated their combined managerial impact on classroom climate and multidimensional engagement within secondary education. Therefore, this study investigates: How does the synergy of Kahoot and Project-Based Learning function as a digital classroom management strategy to enhance students' grammar achievement and learning engagement in conditional sentence type 1?

This study aims to provide theoretical contributions to technology-enhanced instructional management literature and practical models for educators and school leaders seeking to optimize classroom management practices through digital innovation.

II. METHODS

This study utilized a sequential explanatory mixed-methods design (Sugiyono, 2013, 2021), where quantitative data regarding instructional effectiveness were gathered first and subsequently elucidated by qualitative observations of classroom management dynamics and learner engagement. The quantitative phase employed a **Nonequivalent Control Group Design**:

- a. Experimental Class: Managed using the integrated Kahoot and Project-Based Learning (Kahoot-PjBL) framework.
- b. Control Class: Managed using conventional, teacher-centered direct instruction.

1. Participants and Setting

The study was conducted at SMA Swasta Budi Agung Medan during the 2025/2026 academic year. The population comprised all 68 eleventh-grade students in the Tahfidz Program. Utilizing a total sampling technique (Arikunto, 2010), the entire population of 68 students across two intact classes was designated as the sample (Experimental Group: $n = 34$; Control Group: $n = 34$).

2. Instruments and Data Collection

- a. Grammar Competence Test: A 20-item multiple-choice test on conditional sentence type 1 administered as pre-test and post-test to quantify learning gains.
- b. Classroom Management & Engagement Observation Sheet: Structured rubric and field notes tracking behavioral, cognitive, and emotional engagement indicators based on the framework of Fredricks et al. (2004).

3. Data Analysis

- a. Quantitative: Processed via SPSS using Shapiro-Wilk normality tests, Levene's homogeneity of variance tests, and Independent Sample t-tests at an alpha level = 0.05.
- b. Qualitative: Analyzed using the interactive model of Miles, Huberman, and Saldaña (2014) through data condensation, data display, and conclusion drawing/verification to examine classroom environmental shifts.

III. RESULT AND DISCUSSION

1. Quantitative Results: Academic Performance Under Contrasting Management Models

Pre-test assessments demonstrated that both classes entered the intervention with comparable baseline competencies. Following the intervention, substantial divergence occurred:

Table 1. Pre-Test and Post-Test Summary of Instructional Management Models

Group Management Model	Pre-test Mean	Post-test Mean	Gain (Δ)	Post-test Mastery Rate
Experimental (Kahoot-PjBL Management)	65	72	+7	73%
Control (Conventional Direct Management)	62	60	-2	61%

Normality ($p > 0.05$) and homogeneity ($p > 0.05$) assumptions were satisfied. The independent sample t-test generated a value of t-statistic resulting in $\text{Sig. (2-tailed)} = 0.004$ ($p < 0.05$). This confirms a statistically significant difference between the digital collaborative management model and conventional

classroom management, proving that structured digital intervention significantly elevates academic achievement.

2. Qualitative Results: Classroom Dynamics and Engagement Dimensions

Observations categorized student engagement across three core dimensions:

Table 2. Qualitative Observation of Classroom Management Dynamics

Engagement Dimension	Indicators Observed	Experimental Class (Kahoot-PjBL)	Control Class (Conventional)
Behavioral Management	Time on task, following instructions, active contribution, assignment completion.	High level of compliance, eager participation in digital quizzes, seamless transitions between group work and individual tasks.	Passive presence, occasional off-task behaviors, limited interaction during teacher explanations.
Cognitive Management	Deep comprehension, peer feedback, self-monitoring, contextual problem solving.	Students actively identified grammatical errors via immediate Kahoot analytics, negotiated sentence patterns, and synthesized grammar in project outputs.	Surface-level retention, low willingness to ask questions, mechanical completion of worksheet drills.
Emotional/Climate Management	Motivation, enthusiasm, healthy competition, anxiety reduction.	Dynamic and supportive classroom climate, high enthusiasm driven by gamified leaderboards, cooperative team spirit.	Low enthusiasm, heightened boredom, passive compliance without emotional investment.

3. Discussion: Pedagogical Synergy and Management Implications

The empirical findings demonstrate that integrating Kahoot with PjBL represents a transformative classroom management strategy that resolves the inherent limitations of conventional instruction.

a. Gamified Instructional Control & Formative Assessment:

Kahoot served as an efficient classroom management mechanism for pacing and diagnostics. Instead of delayed evaluations, real-time leaderboard analytics allowed the instructor to instantly detect learning gaps and deliver precision interventions (Alawiyah et al., 2024; Özdemir, 2025). The gamified features generated positive emotional arousal, transforming routine grammar drills into interactive learning challenges.

b. Structured Collaborative Workflow:

PjBL provided the organizational architecture for the classroom. It redistributed instructional responsibility from teacher-centered lecturing to student-centered collaboration. Students assumed defined roles, regulated their peer-learning timelines, and embedded abstract grammar patterns into tangible authentic projects (Nurlaly, 2024).

c. Holistic Engagement as a Function of Classroom Management:

The quantitative gains (gain of +7 points; $p = 0.004$) are a direct consequence of improved multidimensional engagement. Effective management minimized off-task behaviors and elevated cognitive accountability. However, field observations also indicated that initial sessions required clear ground rules to

manage excitement during digital quizzes, highlighting that teacher competence in classroom orchestration remains fundamental.

IV. CONCLUSION

The synergy of Kahoot and Project-Based Learning operates as an effective digital classroom management model that significantly improves students' grammar competence and classroom engagement in secondary education. Quantitative evidence confirmed significant mastery gains over conventional methods ($p = 0.004$), while qualitative observations substantiated marked improvements in behavioral self-regulation, cognitive processing, and motivational climate.

Managerial Implications for Educational Practice

1. For Teachers & Instructional Designers: Educators must shift from traditional lecturers to instructional managers who utilize real-time digital analytics (Kahoot) to steer collaborative, inquiry-based group workflows (PjBL).
2. For School Principals & Curriculum Managers: Institutional leadership should support digital classroom innovation by facilitating digital infrastructure and organizing continuous professional development (CPD) programs centered on technology-integrated classroom management models.

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