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AI-Augmented Gamified Learning And Its Impact On Motivation In Primary English Classes

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Abstract: Motivating young learners to sustain effort in foreign language classrooms remains a central challenge for teachers, particularly at the primary level where attention spans are short and proficiency is emergent. Gamified learning has shown promise in making practice more engaging, yet points-and-badges alone rarely address the diverse needs of early learners. This article examines an AI-augmented approach to gamification in primary English classes that combines adaptive task sequencing, automated formative feedback, and conversational agents with narrative game mechanics. Drawing on self-determination theory, the ARCS model of motivational design, and flow theory, the study investigates whether AI supports the motivational mechanisms that underwrite durable engagement. A twelve-week quasi-experimental intervention with third- and fourth-grade pupils compared an AI-augmented, gamified English program to business-as-usual instruction across two schools. Motivation was measured with an age-adapted instrument covering interest/enjoyment, perceived competence, autonomy, and classroom attention; qualitative observations and brief learner interviews complemented the quantitative data. ANCOVA analyses controlling for baseline differences indicated significantly higher post-intervention scores in interest/enjoyment and perceived competence for the experimental group, alongside improved on-task behavior and voluntary practice time logged outside class. indings support the hypothesis that AI can turn gamified surface engagement into deeper motivational dynamics when design aligns with sound pedagogy.

Keywords: Artificial intelligence in education; gamification; primary English; motivation; self-determination theory; ARCS model; flow; adaptive learning; formative feedback; young learners.

Introduction: Primary English classrooms are charged with cultivating enthusiasm for language while building foundational skills in phonics, vocabulary, pronunciation, and simple discourse. Motivation at this stage is particularly fragile because learners are still forming beliefs about their own competence and about what it means to learn a language. Gamification has been used to make repetitive practice more palatable; however, the well-known pitfalls of “pointsification” show that extrinsic rewards do not automatically foster lasting interest or self-efficacy. To influence motivational quality rather than mere behavioral compliance, design must engage the psychological needs of autonomy, competence, and relatedness, present content through purposeful attention strategies, and calibrate challenge to maintain flow.

Artificial intelligence offers complementary affordances that traditional gamification lacks. Adaptive engines can tailor task difficulty and practice spacing to each learner’s current level, keeping the experience in a zone where success is plausible yet never trivial. Automated speech recognition and natural language processing can return specific, timely feedback on pronunciation and simple utterances, strengthening the sense of progress that fuels competence beliefs. Conversational agents can scaffold practice in playful, low-stakes dialogues, while learning analytics help teachers orchestrate group dynamics and identify learners who need additional support.

Despite rapid advances, evidence about how AI should be fused with game mechanics in primary English classes remains thin. Studies often treat AI and gamification separately, focus on older students, or report short-term satisfaction rather than theoretically grounded measures of motivation. This article situates AI-augmented gamification within established

motivational frameworks and presents empirical findings from a primary school intervention. The central claim is that when AI functions are harnessed to support autonomy, competence, and attention, gamification becomes more than an incentive layer; it becomes a vehicle for sustained, self-determined engagement with language learning.

Aim

The study aimed to examine the impact of an AI-augmented, gamified English learning program on the motivation of primary learners. Specifically, it tested whether the intervention would increase interest/enjoyment, perceived competence, autonomy, and classroom attention compared with business-as-usual instruction, and it explored how learners and teachers interpreted the motivational effects of AI features embedded in game-based activities.

The research used a quasi-experimental pretest–posttest design in two public schools with comparable demographics. Participants were 126 pupils in grades three and four (ages eight to ten), assigned by intact class to either the experimental condition (AI-augmented gamified program, four classes, n=64) or the control condition (regular English lessons following the same syllabus, four classes, n=62). Both groups received three English lessons per week over twelve weeks covering the same communicative objectives and vocabulary sets aligned with the national curriculum.

The experimental program ran on tablets during two class sessions per week and as optional home practice. Core mechanics included narrative quests in which teams solved story-driven missions by completing micro-tasks targeting phonics, vocabulary recognition, and short oral exchanges. The AI layer comprised three components. First, an adaptive scheduler adjusted practice frequency and item difficulty based on learner performance, prioritizing items with higher error probability and spacing repetitions to promote retention. Second, a speech feedback module provided immediate segmental and suprasegmental cues during pronunciation tasks, coupled with visualizations that showed “how close” a production was to the target. Third, a rule-based conversational agent offered scaffolded dialogues with selectable prompts, allowing learners to choose topics and rehearse utterances privately before speaking publicly. Teachers accessed a dashboard to monitor progress and to form mixed-ability teams for cooperative tasks.

Motivation was assessed using an age-adapted measure that combined elements of the Intrinsic Motivation Inventory and classroom attention ratings aligned with the ARCS framework. Four composite indices were computed: interest/enjoyment, perceived competence, autonomy (sense of choice), and attention (captured through teacher logs of on-task behavior and a brief pupil self-check). Internal consistency for the indices ranged from 0.78 to 0.86 at pretest. To contextualize the numbers, the team conducted structured observations in two classes per condition and brief semi-structured interviews with a stratified sample of 24 pupils and eight teachers after the intervention.

Analytically, ANCOVA models estimated posttest differences between conditions on each motivational index, controlling for baseline scores and class as a random effect. Effect sizes were reported using Cohen’s d derived from adjusted means. Observation notes and interview transcripts were coded deductively for references to autonomy, competence, relatedness, attention, and design features perceived as helpful or challenging.

Quantitative analyses showed advantages for the experimental group on interest/enjoyment and perceived competence. After controlling for pretest values, the AI-augmented, gamified classes scored higher on interest/enjoyment with a medium effect size, and perceived competence with a slightly smaller but still practically meaningful effect. Autonomy scores were modestly higher but did not reach conventional thresholds for statistical significance once class effects were accounted for. Attention indicators revealed longer stretches of on-task behavior during tablet-based segments, fewer teacher redirections, and increased voluntary practice time recorded on the platform outside class hours.

The pattern of results was consistent across grades. Third graders exhibited particularly strong gains in enjoyment, whereas fourth graders showed steadier improvements in competence ratings, a difference that teachers attributed to developmental shifts in metacognitive awareness. Attendance remained high in both conditions; however, the experimental classes reached narrative “milestones” at similar rates despite wide initial proficiency differences, suggesting the adaptive engine kept most learners engaged at an appropriate challenge level.

Qualitative data provided a coherent explanation for the numbers. Observations noted that children quickly learned to interpret the speech feedback visualizations as a guide for incremental improvement rather than as a pass/fail signal. Pupils frequently repeated items voluntarily to “turn the meter green,” a behavior teachers associated with the emergence of productive persistence. Choices embedded in quests—such as

selecting which role to play or which vocabulary path to unlock—were cited by learners as reasons they felt "in charge," even when overall autonomy scores did not shift dramatically. Cooperative boss-battles that required pooling earned hints promoted peer tutoring, and quieter pupils often rehearsed with the conversational agent before speaking to the group, which reduced visible anxiety during live tasks.

The data also surfaced design tensions. A subset of learners reported discomfort with speaking to a device, especially early in the program, and a small group experienced discouragement when the feedback meter hovered just below the success threshold. After teachers enabled a private-rehearsal mode and widened the success band for first attempts, the affected learners re-engaged. Teachers emphasized the necessity of active facilitation to prevent the game layer from overshadowing communicative goals; they used the dashboard to identify when item-level practice crowded out time for open-ended speaking.

The findings support the proposition that AI can amplify the motivational value of gamified activities when design is guided by robust theory. From a self-determination perspective, the intervention bolstered competence through timely, specific feedback on micro-skills and through adaptive sequencing that maintained challenge in learners' proximal zones. The medium-sized gains in perceived competence align with the observed willingness to repeat tasks to improve outcomes, reflecting a shift from reward seeking to mastery-oriented engagement. Autonomy effects were smaller, which is unsurprising in primary contexts where curricular constraints and classroom management necessarily limit choice. Nonetheless, even bounded choices—selecting roles, ordering tasks, or opting into private rehearsal—were meaningful to learners and may lay groundwork for stronger autonomy later.

Keller's ARCS model helps interpret the attention results. The narrative wrapper, surprise rewards, and visual feedback captured attention, while relevance was maintained by aligning quests with familiar themes from the coursebook and local culture. Confidence grew through the visible progress meters and calibrated difficulty, and satisfaction came from team accomplishments that were shared publicly rather than from solitary point tallies. This shift away from purely extrinsic signals is crucial because early reliance on badges can undermine intrinsic interest if not accompanied by experiences of improvement and agency.

Flow theory further clarifies why AI and gamification together can sustain engagement where either alone might falter. Dynamic challenge maintained the skill–challenge balance at the heart of flow, while immediate feedback shortened the loop between action and adjustment. Importantly, the game state afforded safe failure, allowing learners to experiment with pronunciation or lexical choices without the social risks of public error. For anxious pupils, the conversational agent created a rehearsal buffer that protected face while building fluency.

At the same time, the study underscores design responsibilities. Automated feedback must be intelligible to children and framed as guidance rather than judgment; otherwise, it can become a demotivating scoreboard. Voice analytics should default to privacy-respecting modes, storing only what is pedagogically necessary and making data use transparent to families. Teachers remain central as orchestrators who connect micro-practice to communicative purpose, redirect attention from the screen to peers at the right moments, and interpret dashboard signals with professional judgment. Without this mediation, even sophisticated adaptive engines can encourage narrow drilling that neglects broader language use.

Limitations temper the conclusions. The quasi-experimental design and limited number of schools constrain generalizability, and the twelve-week window does not capture long-term motivational trajectories. Autonomy measures at this age face validity challenges, and the study did not include delayed posttests to link motivational shifts to durable language outcomes. Future research should extend the timeline, triangulate motivation with learning gains in pronunciation and vocabulary retention, and compare varying intensities of AI features to isolate their specific contributions. Cross-cultural replications would also clarify how narrative themes and reward structures interact with local classroom norms.

AI-augmented gamified learning can move primary English instruction beyond superficial engagement when its features are deliberately aligned with motivational principles. In this study, adaptive sequencing and intelligible, immediate feedback supported competence; bounded choice and private rehearsal supported emerging autonomy; and narrative quests organized attention and satisfaction in ways that sustained effort. The resulting motivational improvements were moderate but educationally meaningful, especially in early learners for whom a few clear experiences of success can reshape beliefs about language learning. The practical message is not to add AI on top of games, but to use AI to make gameful tasks responsive, supportive, and pedagogically purposeful. With careful design and teacher stewardship, such

systems can help young learners experience English not as a string of drills but as a playable, learnable world in which their actions matter.

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