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Integration of Gamification and Local Wisdom for Character Education and English Learning Outcomes

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Abstract

English language learning in the digital era faces a dual challenge: gadget-driven distraction that lowers learning motivation and weak character reinforcement among students, while gamification and local wisdom are still more often applied separately, so that they have not yet optimally created learning that is both engaging and culturally meaningful. This study examines how the integration of gamification and Mandar local wisdom is applied in English language learning and its effect on student character and learning outcomes. Using a mixed-methods sequential exploratory design, the study was conducted at SMP Negeri 1 and SMA Negeri 1 Mamuju, involving 120 students (two experimental and two control classes) and four teachers. Data were collected through observation, questionnaires, interviews, pretest-posttest achievement tests, and a 30-item character observation sheet, then analyzed through Miles and Huberman reduction, coding, and triangulation for qualitative data, and t-tests and ANCOVA for quantitative data. Results show a significant improvement in learning outcomes at both levels ($p < 0.05$), with the treatment effect in fact larger at SMP ($\eta^2 = 0.131$) than at SMA ($\eta^2 = 0.094$), while the effect on student character is in fact stronger and more even at SMA (a difference of 45.00 points) than at SMP (25.83 points), an opposite-direction pattern across levels that constitutes this study's novel finding. Honesty-integrity remains the most challenging dimension across all classes. Further research is recommended to extend the treatment duration at the SMP level.

Keywords: Gamification; Local Wisdom; Character Education; English Learning Outcomes; Mixed Methods

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Introduction

Indonesian education is required to balance academic achievement with the strengthening of learners' character, a demand that becomes increasingly complex when learning takes place amid the rapid flow of digital technology. Ironically, technology that should enrich the learning process often becomes a source of distraction instead: uncontrolled use of social media and gadgets has been shown to be associated with declining attention, motivation, and academic achievement among students (Barton et al., 2021; Dialde, 2023). A recent meta-analysis even confirms that technology-related factors consistently influence students' academic performance across educational levels and contexts (Kuş, 2025), while exposure to technology and social media that is not balanced with guidance also negatively affects students' character development (Tampubolon et al., 2024). In the context of English language learning in Mamuju, West Sulawesi, this condition is empirically confirmed: preliminary observation at SMA Negeri 1 and SMP Negeri 1 Mamuju showed that distraction scores caused by gadgets reached the highest point on the observation instrument (a score of 4 out of a scale of 4) at both schools, reinforced by teacher and student questionnaires as well as teacher interviews that consistently identified gadgets as the main source of lost learning focus. This condition underlies the urgency of the present study, which is how to design English language learning capable of recapturing students' attention and motivation amid digital distraction, while simultaneously strengthening character values as the foundation of national education. As a region with a population that is predominantly of Mandar ethnicity, Mamuju holds a wealth of local wisdom, ranging from maritime traditions such as Sayyang Pattuduq, the Sandeq Boat Race, and the Malaqbi' philosophy of life, to traces of the history of the Balanipa Kingdom, which holds great potential to be developed into contextual English language learning content, yet based on preliminary observation has not been utilized systematically, a gap that simultaneously represents an opportunity for this study.

One approach widely proposed to address this motivational challenge is gamification, namely the application of game elements and mechanics (points, levels, challenges, feedback) within non-game learning contexts (Christopoulos & Mystakidis, 2023). From a theoretical perspective, the effectiveness of gamification is explained through Self-Determination Theory, which asserts that game elements can fulfill humans' basic psychological needs for autonomy, competence, and social relatedness, thereby fostering intrinsic motivation (Deci & Ryan, 1985). Various empirical studies reinforce this claim: gamification has been shown to increase motivation and English learning outcomes (Alenazi, 2025; Al-Sabbagh, 2023; Lee & Baek, 2023; Laksanasut, 2025), including in aspects of vocabulary acquisition, retention, and self-confidence (Kaya & Ercag, 2023; Seo et al., 2024), further reinforced by a systematic review across higher education levels (Laura-De La Cruz et al., 2023) and a study on the general benefits of gamification for language learning (Shahidan & Kamarol Ariffin, 2024), and is significantly mediated by learning motivation in online language learning contexts (Shen et al., 2024). The relevance of motivation and curriculum context to English proficiency is also affirmed by studies on language development curriculum materials (Lê & Polikoff, 2021) and the role of motivation and learning strategies in mobile-based language learning (Yu et al., 2023), two studies that together emphasize that success in English language learning does not depend solely on teaching materials, but also on how those materials are delivered in a motivating way relevant to learners' daily lives. On the other hand, local wisdom is also regarded as a key element of contextual and

character-building English language learning: linking materials with mutual cooperation, traditional philosophy, and local folklore has proven effective in enriching learning content while internalizing character values such as cooperation, responsibility, and cultural pride (Huda Shofyana et al., 2022; Saputra et al., 2023; Anggraini & Riyanti, 2025), including through a "curriculum of love" approach that integrates affective values into language learning (Kuswanto, 2025) and the strengthening of character values through local-wisdom-based language learning in South Sulawesi (Rasyid & Aisa, 2024). The relevance of local cultural context to language learning is also affirmed across international contexts (Ordóñez Procel et al., 2023; Romrome & Ena, 2022; Shrestha, 2016), consistent with findings that local-wisdom-based teaching materials contribute to more meaningful language skill development (Hulu et al., 2024; Nasir & Andriani, 2020).

Nevertheless, the literature review above shows that gamification and local wisdom have thus far been more often studied and applied separately. Gamification research generally focuses on cognitive achievement without incorporating local cultural content relevant to students' identity, while local-wisdom research tends to employ conventional pedagogical approaches that underutilize the appeal of game elements for the digital generation. Efforts to integrate the two have indeed begun to emerge, like local-wisdom-based gamification research in other subjects in Indonesia has been shown to positively influence students' problem-solving ability (Ahmar et al., 2023), and a challenge-based learning approach using folklore-based interactive media has also proven effective in strengthening local wisdom values as well as elementary students' learning outcomes (Yusnan et al., 2025). However, these studies generally still employ a single method (quantitative or qualitative only), focus on a single educational level or subject, use limited samples, provide minimal analysis of the mechanisms explaining how the two approaches reinforce one another, and none has specifically examined the integration of gamification and local wisdom in English language learning across two different educational levels simultaneously to assess the consistency of its influence on learning outcomes and character. This gap forms an important foundation for the present study, both theoretically (the mechanism of integrating the two approaches), methodologically (the triangulated combination of quantitative and qualitative data), and contextually (the wealth of Mandar local wisdom that has not been widely utilized in English language learning). This methodological gap becomes even more salient when research is conducted across two educational levels at once, since few studies have explicitly examined whether the effect of a single instructional treatment works consistently at both the junior high school (SMP) and senior high school (SMA) levels, or is instead moderated by the differing developmental characteristics of students at each level.

Based on this gap, the present study aims to develop and examine the effect of integrating gamification and Mandar local wisdom in English language learning on students' learning outcomes and character development across two educational levels, namely junior high school (SMP) and senior high school (SMA). Two research questions are posed: (1) how are gamification and Mandar local wisdom integrated into English language learning at SMP Negeri 1 and SMA Negeri 1 Mamuju? and (2) how does this integration affect English learning outcomes and students' character change at both levels? Grounded in the theoretical and empirical review above, this study hypothesizes that (H1) students who undergo learning integrated with gamification and local wisdom will show significantly higher English learning outcomes than students who undergo conventional learning, and (H2) students in the experimental group will show

consistently higher character scores than the control group across the character dimensions measured.

Research Methods

This study employs a mixed-methods approach with a sequential exploratory design, combining qualitative data collection in the initial stage with quantitative data collection in the subsequent stage, enriched with embedded qualitative data in the final stage to deepen understanding of students' character change (Creswell & Creswell, 2022; Sugiyono, 2013). This design was selected because the research needs could not be fully addressed by a single data type: the initial qualitative stage (needs analysis through observation, questionnaires, and teacher interviews) was necessary to understand the actual learning conditions, gaps, and relevant local wisdom as the basis for developing integrated teaching materials, whereas the quantitative stage was necessary to measurably test the effect of these materials on learning outcomes. This combination of data types also enables methodological triangulation: quantitative findings on learning outcomes can be enriched in meaning by qualitative findings on character change, so that the final interpretation answers not only (whether) the treatment had an effect, but also (through what mechanism) that effect operated. For the effect-testing stage, the study employed a quasi-experimental design in the form of a nonequivalent control group design, a design that compares experimental and control groups without full random assignment, yet still involves pretest-posttest measurement in both groups to control for differences in prior ability (Fraenkel et al., 2012), a design that is methodologically most appropriate for research in natural classroom settings where individual randomization is not feasible. All research instruments, including the needs questionnaire, character observation sheet, interview guide, and learning achievement test, were developed in the early stage and validated by expert lecturers before use, complemented by a reliability check through Cronbach's Alpha coefficient, so that the instruments used in both the quantitative and qualitative data collection stages met the requirements of validity and reliability.

The research data sources consisted of primary and secondary data. Primary qualitative data included field notes from classroom observation, results of the teacher and student needs questionnaires, interview transcripts from two English teachers (one each from the SMA and SMP levels), and the post-treatment student character observation sheets. Primary quantitative data included pretest and posttest English learning outcome scores of students in the experimental and control groups. Secondary data included Kurikulum Merdeka (Independent Curriculum) documents, English learning outcome standards, and the Pancasila Student Profile framework as a reference for developing character indicators (Gumilar & Permatasari, 2023). The study was conducted at two state schools in Mamuju Regency, namely SMP Negeri 1 Mamuju and SMA Negeri 1 Mamuju, selected because they had implemented the Kurikulum Merdeka and had certified English teachers. The research sample was determined through purposive sampling based on the equivalence of students' ability levels, yielding a total of 120 students divided into four classes (one experimental class and one control class of 30 students each at every level) along with four teachers as interview informants. The character observation sheet used in the final stage contained 30 behavioral statement items divided evenly across six dimensions (five items per dimension), namely cooperation, responsibility, honesty and integrity, empathy and respect for others, discipline and sportsmanship, and confidence and appreciation of

local wisdom, with a rating scale of 1 (never observed) to 4 (always observed) for each item, so that the maximum total score per student was 120.

Data collection was carried out through five main techniques: observation (field notes in the initial stage and the 30-item character observation sheet rated on a 1-4 scale across the six dimensions above in the final stage), Likert-scale needs questionnaires for teachers and students, semi-structured interviews with teachers, and English learning achievement tests administered as a pretest before and a posttest after the treatment was given. Qualitative data were analyzed using the interactive model of Miles and Huberman (1994), consisting of three stages: data reduction (summarizing and focusing raw data on relevant themes), data display through coding (grouping patterns into codes and thematic categories), and conclusion drawing through methodological triangulation (comparing findings across observation, questionnaires, and interviews to assess consistency). The coding process was carried out through open coding, namely labeling units of raw data without predetermined categories, which were then grouped into codes and broader themes (such as motivation, digital distraction, gamification practice, local wisdom integration, and character development) to facilitate the identification of patterns across data sources. Quantitative data were analyzed in stages: the Shapiro-Wilk normality test and Levene's homogeneity test as prerequisite tests, followed by a paired samples t-test to examine the increase in scores within each group, an independent samples t-test on N-Gain scores (Hake, 1998) to compare the magnitude of improvement between groups, and analysis of covariance (ANCOVA) with the pretest score as covariate to test the effect of the treatment on the posttest in a controlled manner, complemented by effect size calculation (partial eta squared) to assess the practical magnitude of that effect.

Results and Discussion

Results

Preliminary Study Findings

Before the treatment was administered, triangulation of observation, questionnaire, and interview data at the preliminary study stage revealed five main themes. First, students' motivation and participation in English language learning were low and uneven, consistently confirmed by all three data sources (interest and willingness-to-speak-up questionnaire scores of 1.75-2.0; observed participation of around 70% at SMA and lower at SMP). Second, distraction caused by gadgets was the issue with the highest level of convergence, confirmed by the maximum observation score (4 out of 4) at both schools, a high questionnaire score (4.0), and explicit statements from both teachers in the interviews. Third, teachers' gamification practices remained minimal (a game element score of only 1 out of 4 in observation; a reward or level practice score of 2.0 on the questionnaire), even though students' perceptions of gamification were highly positive (scores of 3.25-4.0). Fourth, local wisdom had not yet been explicitly integrated into teaching materials (an observation score of 1 out of 4), however, triangulation revealed an important nuance that this gap was not caused by a lack of teacher knowledge, since the interviews in fact showed that both teachers possessed rich contextual knowledge of Mandar local wisdom, such as the Sayyang Pattuduq tradition, the Sandeq Boat Race, the Malaqbi' value, the Balanipa Kingdom, and Jepa cuisine. Fifth, collaborative character traits (cooperation and responsibility) had developed naturally through group activities (an observation score of 3 out of 4), while character traits requiring explicit habituation, such as honesty and sportsmanship,

remained at a moderate level (a questionnaire score of 2.5). Triangulation also confirmed that baseline conditions at SMP were generally more behind those at SMA, particularly in terms of equipment availability and experience implementing engaging classroom activities. Observational field notes recorded that SMP had no interactive learning aids at all, while SMA had already made use of simple quiz applications, an initial gap relevant to understanding the differing patterns of treatment effectiveness across levels found in the subsequent stage. These findings formed the empirical basis for developing the integrated gamification and local-wisdom teaching materials in the subsequent stage.

English Learning Outcomes

Descriptive statistics show that the experimental and control groups had relatively equivalent starting points (pretest) at both levels, but differed sharply after the treatment was administered (Table 1). At the SMA level, the pretest scores of the experimental group (M = 60.00; SD = 7.12) and the control group (M = 58.13; SD = 5.53) were not far apart, yet the experimental group's posttest rose to M = 88.53 (SD = 5.91) while the control group reached only M = 67.67 (SD = 3.93). A similar pattern occurred at the SMP level: pretest scores were M = 64.15 (SD = 6.87) for the experimental group and M = 61.82 (SD = 5.41) for the control group, while posttest scores reached M = 90.14 (SD = 5.56) for the experimental group and M = 65.87 (SD = 6.10) for the control group. Prerequisite testing showed that all pretest and posttest data in both groups at both levels were normally distributed (Shapiro-Wilk, $p > 0.05$) and homogeneous (Levene's test, $p > 0.05$), thus meeting the requirements for parametric analysis (Table 2). As an illustration, Shapiro-Wilk significance values at both levels ranged from 0.080 to 0.200, while Levene's test significance values for equality of variance ranged from 0.383 to 0.997, both well above the 0.05 threshold required for the t-tests and ANCOVA used in the subsequent analysis stage.

Next, the paired samples t-test showed that both groups at both levels experienced a significant increase in scores from pretest to posttest ($p < 0.001$), but with markedly different magnitudes. The SMA experimental group rose by 28.53 points while the control group rose by only 9.54 points; the SMP experimental group rose by 25.99 points while the control group rose by 4.05 points (Table 3, Figure 1). To more rigorously test the significance of the difference in improvement magnitude between groups, an independent samples t-test was conducted on N-Gain scores (Hake, 1998). The result was significant on both sides at the SMP level ($t = 2.190$; $df = 58$; two-tailed $p = 0.033$) but significant on only one side at the SMA level ($t = 1.840$; $df = 58$; one-tailed $p = 0.035$; two-tailed $p = 0.071$) (Table 4). The ANCOVA test with pretest score as covariate confirmed that the effect of Group on the posttest remained significant at both levels after controlling for prior ability (SMA: $F = 5.933$; $p = 0.018$; partial eta squared = 0.094, medium category; SMP: $F = 8.566$; $p = 0.005$; partial eta squared = 0.131, medium-to-large category), while the pretest covariate itself had no significant effect at either level (Table 5). The ANCOVA with pretest as covariate was chosen so that the posttest comparison between groups would not rely solely on raw scores, but would account for and control for possible differences in students' prior ability before the treatment was given, so that the observed effect of the group could be attributed more confidently to the treatment itself. An interesting finding here is the *effect size*. It was higher at the SMP level than at the SMA level, indicating that, statistically, the effect of the treatment on cognitive English learning outcomes was slightly stronger and more accurate at the SMP level.

Table 1. Descriptive Statistics of English Learning Outcomes

Level	Group	Test	N	Mean	SD
SMA	Experimental	Pretest	30	60.00	7.12
SMA	Experimental	Posttest	30	88.53	5.91
SMA	Control	Pretest	30	58.13	5.53
SMA	Control	Posttest	30	67.67	3.93
SMP	Experimental	Pretest	30	64.15	6.87
SMP	Experimental	Posttest	30	90.14	5.56
SMP	Control	Pretest	30	61.82	5.41
SMP	Control	Posttest	30	65.87	6.10

Table 2. Normality and Homogeneity Test Results

Level	Test	Statistic	Sig.	Conclusion
SMA	Shapiro-Wilk Normality (Pretest Exp./Control; Posttest Exp./Control)	—	0.146 / 0.093 / 0.141 / 0.100	Normal
SMA	Levene's Homogeneity (Pretest / Posttest)	0.000 / 0.774	0.997 / 0.383	Homogeneous
SMP	Shapiro-Wilk Normality (Pretest Exp./Control; Posttest Exp./Control)	—	0.146 / 0.093 / 0.141 / 0.080	Normal
SMP	Levene's Homogeneity (Pretest / Posttest)	0.040 / 0.257	0.843 / 0.614	Homogeneous

Table 3. Paired Samples T-Test Results (Pretest-Posttest)

Level	Group	Pretest Mean	Posttest Mean	Difference	Sig. (p)
SMA	Experimental	60.00	88.53	+28.53	< 0.001
SMA	Control	58.13	67.67	+9.54	< 0.001
SMP	Experimental	64.15	90.14	+25.99	< 0.001
SMP	Control	61.82	65.87	+4.05	< 0.001

Table 4. Independent Samples T-Test Results for N-Gain Score

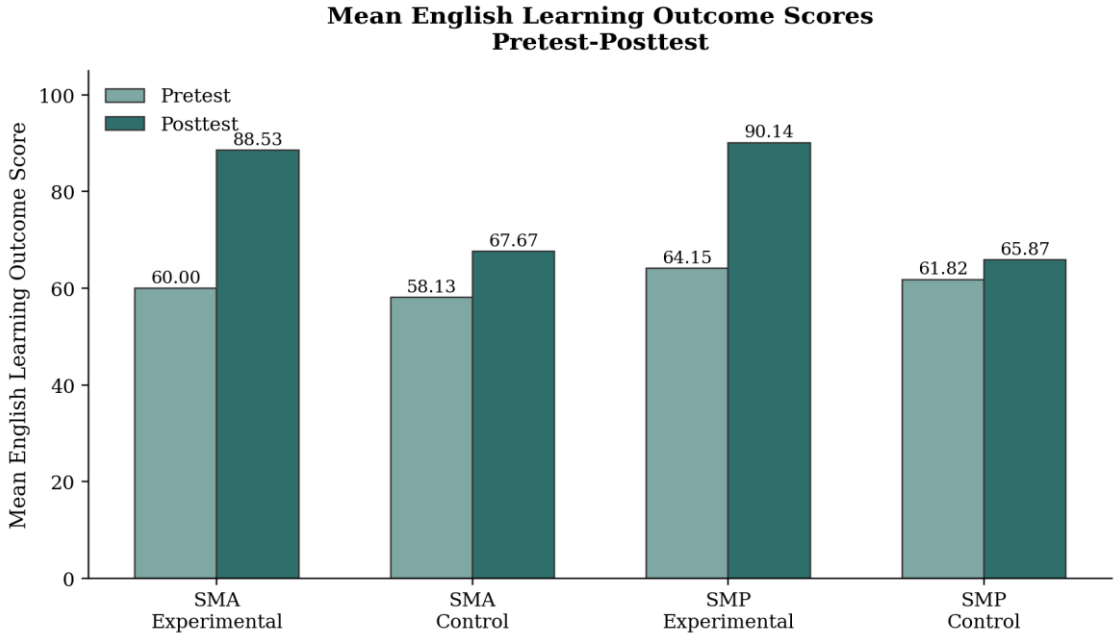
Level	t	df	Sig. 1-tailed	Sig. 2-tailed	Mean Diff.	Interpretation
SMA	1.840	58	0.035	0.071	0.0999	Significant 1-tailed; marginal 2-tailed
SMP	2.190	58	0.016	0.033	0.1088	Significant on both sides

Table 5. ANCOVA Results (Covariate: Pretest and Dependent Variable: Posttest)

Level	Source	F	Sig.	Partial η^2	Effect Size Interpretation
SMA	Pretest	0.119	0.731	0.002	Small, covariate not significant
SMA	Group	5.933	0.018	0.094	Medium, group effect significant

SMP	Pretest	0.019	0.891	0.000	Small, covariate not significant
SMP	Group	8.566	0.005	0.131	Medium to large, significant

Figure 1. Mean English Learning Outcome Scores, Pretest-Posttest



Students' Characters

The 30-item character observation sheet across six dimensions showed that the experimental group consistently outperformed the control group at both levels (Table 7). At the SMA level, the experimental class (X1) achieved a total score of 112 out of 120 (93.33%, Excellent category) compared with the control class (X2) at 58 out of 120 (48.33%, Fair category), a difference of 45.00 percentage points. At the SMP level, the experimental class (VII1) achieved 88 out of 120 (73.33%, Good category) compared with the control class (VII2) at 57 out of 120 (47.50%, Fair category), a difference of 25.83 percentage points. The credibility of this finding is reinforced by the relatively equivalent condition of the control groups across levels (a difference of only 0.83 percentage points), indicating that the large difference in the experimental group is most likely an effect of the treatment rather than a difference in students' baseline characteristics between schools.

At the dimension level (Table 7, Figure 2), an interesting pattern was observed: at SMA, the largest differences occurred in the empathy and respect for others and confidence and appreciation of local wisdom dimensions (+11 points each, with the experimental group's scores reaching the maximum of 20/20 in both dimensions), whereas at SMP, the largest differences occurred instead in the cooperation and responsibility dimensions (+7 points each), while discipline and sportsmanship was the dimension with the smallest difference (+3 points), and eight items at the SMP level even showed identical scores between the experimental and control groups, concentrated in the discipline/sportsmanship and confidence/local wisdom dimensions. At the individual item level, five indicators showed the most pronounced experimental-control differences. Item 30 (students are able to connect local wisdom values with everyday

behavior) recorded the largest difference at both levels simultaneously (SMA: a score of 4 versus 1; SMP: a score of 4 versus 1), confirming that students' connection with local cultural values is one of the most distinctive outcomes of the treatment, and also the item most difficult for the control group to achieve. Three other items with large differences at SMA were students respect the opinions of group members (item 4; score 4 versus 1), students do not cheat during quizzes/games (item 12; score 4 versus 1), and students help classmates who are having learning difficulties (item 18; score 4 versus 1), while at SMP, the largest item-level difference occurred in students divide tasks among group members fairly (item 2; score 4 versus 2). Conversely, the eight items with no difference at SMP were concentrated in the discipline and sportsmanship dimension (including the items students comply with the rules in games or learning activities and students keep trying despite experiencing failure, both scoring 3 in both groups) and confidence and local wisdom (including the item students are confident presenting their work in front of the class, scoring 2 in both groups), indicating that at this level, the treatment was not yet strong enough to differentiate the behavior of experimental from control students, particularly in terms of presentation confidence and consistency in following rules. Across all classes, including the experimental groups, the Honesty and Integrity dimension consistently had the lowest score (16/20 in the SMA/experimental class; 12/20 in the SMP/experimental class), consistent with the preliminary study findings that had already identified this area as a challenge before the treatment was given (an initial questionnaire score of 2.5), demonstrating consistency of findings across time and across methods, while also confirming that change in this dimension likely requires more structured and sustained intervention than other character dimensions that can form through ordinary group experience.

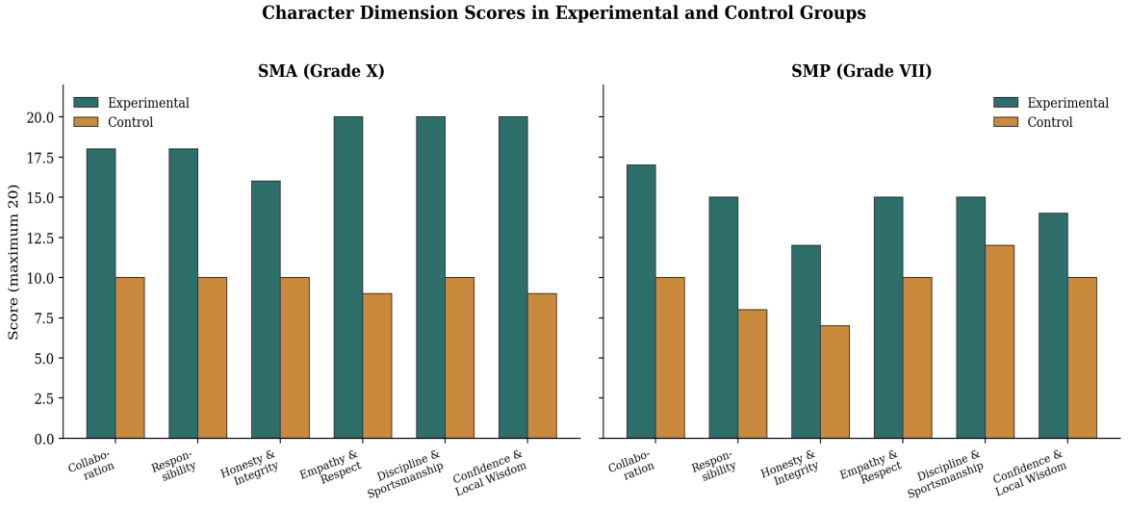
Table 6. Recapitulation of Total Character Scores by Class

Class	School	Group	Score	Max.	%	Category
X1	SMA N 1 Mamuju	Experimental	112	120	93.33%	Excellent
X2	SMA N 1 Mamuju	Control	58	120	48.33%	Fair
VII1	SMP N 1 Mamuju	Experimental	88	120	73.33%	Good
VII2	SMP N 1 Mamuju	Control	57	120	47.50%	Fair

Table 7. Character Dimension Scores (Maximum Scale of 20)

Character Dimension	X1 (Exp.)	X2 (Ctrl.)	SMA Difference	VII1 (Exp.)	VII2 (Ctrl.)	SMP Difference
Cooperation	18	10	+8	17	10	+7
Responsibility	18	10	+8	15	8	+7
Honesty and integrity	16	10	+6	12	7	+5
Empathy and respect	20	9	+11	15	10	+5
Discipline and sportsmanship	20	10	+10	15	12	+3
Confidence and local wisdom	20	9	+11	14	10	+4

Figure 2. Character Dimension Scores in the Experimental and Control Groups



Interconnection Between Variables

Integrating the quantitative and qualitative findings reveals an opposite-direction pattern that only becomes apparent when both types of data are read together (Table 8). In the cognitive domain (learning outcomes), the statistical effect of the treatment was larger and more accurate at the SMP level (partial eta squared = 0.131) than at the SMA level (partial eta squared = 0.094). Conversely, in the affective domain (character), the effect of the treatment was far larger and more evenly distributed at SMA (a 45.00-point difference, superior on six of six dimensions and reaching the maximum score on two dimensions) than at SMP (a 25.83-point difference, with eight items showing no difference at all). This pattern indicates that gamification and local wisdom operate through different mechanisms in the two domains: in the cognitive domain, the SMP control group's very small score increase (+4.05 points) widened the gap with the experimental group (+25.99 points), thereby producing a large effect size; in the affective domain, the greater social-emotional maturity and English proficiency of SMA students (late adolescents) compared with SMP Grade VII students (newly transitioning from elementary school) is thought to have made SMA students more consistently responsive to the gamification and local-wisdom activities across all character dimensions. The implication is that judging the success of a learning innovation from only one type of measure, a test score alone, for instance, risks providing an incomplete picture, since the level that appeared to benefit most cognitively (SMP) was not the level that benefited most affectively, and vice versa.

Table 8. Summary of Integrated Quantitative and Qualitative Effects by Level

Level	Quantitative Effect (ANCOVA Partial η^2)	Effect Category	Character Difference (% points)	Character Category
SMA X	0.094	Medium	45.00	Excellent and Fair
SMP VII	0.131	Medium to Large	25.83	Good and Fair

Discussion

Overall, the findings of this study show that integrating gamification and Mandar local wisdom in English language learning has a significant effect on two domains at once, cognitive learning outcomes and student character development, at both educational levels studied. The experimental group consistently outperformed the control group both on posttest achievement controlled for prior ability (ANCOVA, $p < 0.05$ at both levels) and on character observation scores across all six dimensions measured. However, the magnitude of the effect in the two domains showed a pattern that ran in opposite directions across levels. The effect on learning outcomes was stronger at SMP, whereas the effect on character was stronger and more even at SMA. A consistent common thread across both levels and both data types is that the Honesty and Integrity dimension remained the most challenging area to change, even within the group that received the treatment. Both research hypotheses (H1 and H2) proposed in the introduction were thus supported by the data, with the important caveat that the magnitude and evenness of that effect were not uniform across levels or across character dimensions, a nuance that in fact constitutes the main contribution of this study.

This opposite direction pattern across levels can be understood in light of the relatively equivalent baseline condition of the two control groups (a posttest difference of only about two points and a character-score difference of only 0.83 percentage points), which suggests that the large difference in effect within the experimental groups most likely stems from the treatment itself rather than from differing baseline student characteristics between schools. In the cognitive domain, the SMP control group's very small increase (+4.05 points compared with +9.54 points for the SMA control group) widened the gap with its experimental counterpart, thereby producing a larger ANCOVA *effect size*, a methodological artifact that naturally occurs when the control group's baseline is very low. In the affective domain, the social and emotional maturity of SMA students as late adolescents, combined with their relatively more advanced foundational English proficiency, is expected to have made them more consistently responsive to all the gamification and local wisdom elements provided, whereas SMP students, newly transitioning from elementary school, required a longer adaptation period before character change could be observed evenly across all dimensions. This reflection is also consistent with the preliminary study finding that baseline conditions at SMP were indeed more behind those at SMA in terms of equipment availability and experience with interactive learning, so it is unsurprising that a single treatment cycle was not yet sufficient to bring SMP's affective achievement to parity with SMA's, even though its cognitive achievement had in fact surpassed it. The eight items with no difference at the SMP level, concentrated in the aspects of confidence in presenting in front of the class and consistency in following game rules, also suggest that students at the age of transition from elementary school may require reinforcement of *psychological safety* before the competitive elements of gamification can meaningfully drive behavioral change.

This interpretation can be explained through the framework of Self-Determination Theory (Deci & Ryan, 1985) and flow theory (Csikszentmihalyi, 1990): the gamification elements of points, tiered challenges, and feedback embedded in the teaching materials fulfilled students' psychological needs for competence and autonomy while also fostering optimal engagement when the game challenges matched students' ability, while the integration of Mandar local wisdom content, such as the Malaqbi' value, the Sayyang Pattuduq tradition, and the Sandeq Boat Race, provided a sense of relatedness to students' own cultural identity, a combination that theoretically strengthens intrinsic

motivation more comprehensively than gamification applied without cultural content. The consistency of the Honesty and Integrity dimension as the lowest-scoring dimension across all classes can also be interpreted through differing mechanisms of character development. Collaborative dimensions such as Cooperation and Responsibility can form relatively quickly through structured group activities, whereas honesty requires repeated habituation in situations without direct supervision, a condition not yet explicitly designed into this initial-stage teaching material, so that results were not yet optimal even though the trend of change remained positive relative to the control group. In other words, gamification appears more effective at shaping character traits that can be trained through collective experience and directly observed by fellow students, compared with character traits that depend on individual integrity when unsupervised.

Compared with previous research, these findings both reinforce and extend the existing literature. The effect of gamification on language learning outcomes and motivation found here is consistent with prior meta-analyses and experimental studies (Alenazi, 2025; Lee & Baek, 2023; Kaya & Ercag, 2023; Shen et al., 2024), while the effectiveness of integrating local wisdom on character is consistent with Ahmar et al. (2023), who found a positive effect of local-wisdom-based gamification on problem-solving ability, and Yusnan et al. (2025), who found the effectiveness of folklore-based interactive media learning in strengthening local wisdom values and elementary students' learning outcomes. However, both comparison studies used a single method at a single educational level or subject, and thus could not reveal the opposite-direction moderation pattern between the cognitive and affective domains found in the present study, a novel finding identifiable only through a mixed-methods design comparing two educational levels and two data types in a triangulated manner. Methodologically, the quasi-experimental approach based on direct classroom observation used in this study also complements previous language-gamification studies that relied more heavily on self-report surveys and structural equation modeling (Shen et al., 2024), since measuring character through direct behavioral observation is relatively more resistant to social desirability bias than student self-reports. The finding that honesty is the most challenging character dimension also reinforces observations from other local-wisdom-based character education research (Saputra et al., 2023; Sukarno & Riyadini, 2024), which emphasize that values requiring self-regulation are indeed consistently harder to change than collaborative values. Overall, this comparison shows that the present study does not stand alone, but is part of an accumulation of cross-context evidence that increasingly reinforces the argument that game-based learning will have a far more meaningful and sustainable impact when designed together with culturally relevant content for learners, rather than applied as a standalone motivational technique.

Based on these findings, several recommendations can be put forward. First, for teachers and curriculum developers at the SMP level, the intensity or duration of the gamification and local wisdom treatment should be increased so that its effect on character can be more evenly distributed across the discipline/sportsmanship and confidence/local wisdom dimensions, as has already been achieved at the SMA level. Second, subsequent teaching materials should explicitly design activities that train honesty through an honor system without direct supervision, given that this dimension consistently showed the lowest achievement across all classes and data types. Third, from a policy standpoint, the finding that cognitive and affective effects move in opposite directions across levels suggests that evaluation of the success of gamification-based character education programs should not rely on a single type of data (test scores) alone, but should systematically incorporate affective indicators. Fourth, given the larger

baseline gap at SMP in terms of learning equipment availability, support for simple technological infrastructure (such as access to online quiz applications) should be an initial priority before implementing more complex gamification schemes at this level.

Conclusion

This study concludes that integrating gamification and Mandar local wisdom in English language learning has a significant effect on learning outcomes and student character development at both the SMP and SMA levels in Mamuju. The ANCOVA test demonstrated that the effect of group on learning outcomes remained significant after controlling for prior ability, with the effect size categorized as medium at SMA (partial eta squared = 0.094) and medium-to-large at SMP (partial eta squared = 0.131). At the same time, the character observation sheet showed that the experimental group consistently outperformed on all six character dimensions measured, with a difference of 45.00 percentage points at SMA and 25.83 percentage points at SMP compared with the control group. The most notable finding of this study is the opposite-direction pattern between these two domains according to educational level: the cognitive effect was stronger at SMP, while the affective/character effect was stronger and more even at SMA, a pattern that only becomes apparent when quantitative and qualitative data are read in an integrated manner. This finding answers both research questions posed at the outset, while also confirming that integrating gamification and Mandar local wisdom can not only be applied operationally at both levels, but also produces an effect that is statistically and practically meaningful for both, albeit with a different pattern and emphasis.

Conceptually, this study contributes to enrich the understanding of the mechanism of integrating gamification and local wisdom through the lens of Self-Determination Theory, particularly how the fulfillment of needs for competence, autonomy, and cultural relatedness work simultaneously in a language learning context. Methodologically, the use of a mixed-methods design combining quantitative learning-outcome data and qualitative character-change data in a triangulated manner across two educational levels contributes to a literature still dominated by single-method, single-level studies. Practically, this study produces an empirical basis for developing the gamification and local wisdom learning model, which can be adapted by English teachers in Mamuju and regions with similarly rich local wisdom, while also informing character education policy to take into account differing needs across educational levels. For English teachers specifically, the results of this study offer empirical evidence that investing time in designing teaching materials with local cultural content does not come at the expense of academic achievement, but instead can serve as a lever for both learning outcomes and character.

This study has several limitations that warrant attention in future research. First, the treatment was implemented only for a limited duration as an initial-stage basic study, so the stability of the opposite-direction pattern across levels cannot yet be confirmed over the long term. Second, the research sample was limited to one school per level in a single regency, so generalizing the findings to other local-wisdom contexts or regions should be done with caution. Third, character measurement used an observation sheet that, although validated, remains susceptible to rater bias, so subsequent research is advised to complement it with additional triangulation methods such as reflective student interviews.

Author Contribution Statement

The authors' contributions to this article are as follows: Author 1 served as the initiator and conceptor of the research, developer of the instruments, implementer of data collection, and lead author of the manuscript; Author 2 contributed to the review of curriculum documents, qualitative data analysis, and validation of the analysis results; Author 3 contributed to the preparation of the research, coordination of instrument validation, and review of data visualizations. All three authors approved the final content of the manuscript and are responsible for all aspects of this research.

Statement of Interest

All authors declare that there are no financial or non-financial conflicts of interest relevant to this research.

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