

Game On for SDGs: Gamification Levels Joyful & Mindful 21st-Century Learning

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Abstract

This study investigates the maturity of gamification in fostering joyful and mindful learning among 418 senior high school students in Palu, Central Sulawesi, Indonesia, utilising the G.E.A.R. (Gamification Engagement Adaptive Reflection) framework and its connection to Sustainable Development Goal 4 (SDG 4: Quality Education). The study, utilising a descriptive-comparative survey design, indicates that all participating schools are classified at Level 3.0 (Engaged Integrators), attaining merely 64–67% of the maximum score. Urban schools had somewhat elevated perception means relative to rural schools ($M = 76.21$ vs. $M = 74.03$), with statistically significant disparities among schools ($F(4,413) = 7.14$, $p < .001$). Collaboration and reflection were identified as the most prominent dimensions, whereas competitiveness and autonomy were the least significant, especially in rural regions. Despite the existence of a moderate maturity plateau, the data also underscore areas of resilience among rural pupils. This paper presents a localised urban-rural gamification model designed for developing contexts and advocates for specific "breakout strategies" aimed at improving student autonomy, equitable competition frameworks, and infrastructure equity. These interventions are anticipated to enhance gamification practices to Level 4.0 and expedite the attainment of inclusive and equitable quality education in accordance with SDG 4. The findings offer empirical support for policymakers and educators in archipelagic and resource-limited areas to develop more contextually appropriate and inclusive gamified learning environments.

Keywords: Gamification; Joyful Learning; Mindful Learning; SDG 4; Urban-Rural Disparity.

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1. Introduction

Education in the 21st century urgently requires change, shifting from mere knowledge transfer to the cultivation of pleasant, attentive, and meaningful learning experiences (Taqiyya et al., 2025). Gamification has become one of the most promising new ways to meet this need. Gamification improves students' motivation, engagement, and emotional health by adding game-like features like points, levels, leaderboards, missions, and instant feedback (Thomas & Baral, 2023). In the post-pandemic period, the necessity for learning models that encompass cognitive, affective, and social dimensions has intensified, especially in facilitating the attainment of Sustainable Development Goal 4 (SDG 4): inclusive and equitable quality education (Sun et al., 2025).

Gamification has been extensively implemented in numerous countries; nonetheless, the majority of studies have been on wealthy nations or metropolitan schools in prominent Indonesian cities (Torres Sánchez, 2024). Research on gamification at the senior secondary level is still quite sparse in Eastern Indonesia, especially in Central Sulawesi (Hanifah et al., 2025; Satria Ahmar & Azzajjad, 2025). A more significant gap exists in the dearth of comparison studies analysing urban and rural schools, with the insufficient integration of gamification levelization frameworks with the notion of joyful-mindful learning and its impact on SDG 4 (Patras et al., 2023). Moreover, prior studies have not utilised the G.E.A.R. (Gamification Engagement Adaptive Reflection) framework to assess gamification maturity in the specific context of Central Sulawesi.

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This disparity is especially important because Palu's geography and economy make a big difference between urban and rural communities. Schools outside of cities often have problems with their digital infrastructure, teacher training, and access to technology (Asrianingsih et al., 2023). This can lead to different levels of gamification application and maturity. This study fills this vacuum by looking at how students feel about gamification, putting it into different maturity stages, and looking closely at how it works in cities and rural areas.

This study seeks to: (1) elucidate senior secondary students' perceptions of gamification elements; (2) categorize gamification maturity levels utilizing the G.E.A.R. Level 1.0–5.0 framework; (3) examine disparities in perception and maturity levels between urban and rural schools in Palu; and (4) evaluate the role of gamification in fostering joyful-mindful learning and achieving Sustainable Development Goal 4.

The research exhibits considerable significance and originality. This is the first study in Central Sulawesi to combine the G.E.A.R. model with joyful-mindful learning in an urban-rural setting. It also gives policy suggestions for the Central Sulawesi Provincial Education Office and the Ministry of Education on how to make gamification strategies more inclusive. This research enhances the gamification literature in developing countries by offering actual urban–rural contrasts within an archipelagic region, an area that remains insufficiently examined. The main new thing is the "stock-market dashboard" approach to showing gamification levelization. This lets stakeholders intuitively and strategically understand how students perceive things.

Earlier research has underscored the possibilities of gamification in several settings. (Kaban, 2021) found stronger feedback aspects in urban schools in Turkey. (W. Oliveira et al., 2023) found moderate maturity levels in Brazil, ranging from Level 3.0 to 4.0. (Lee & Baek, 2023) found that urban schools in South Korea had successfully achieved Level 4.0. (Riski & Nasution, 2025) and (Jamilah, 2025) showed that Quizizz-based gamification works well in Indonesia; their results were mostly true only in cities. The current study aims to produce empirical data regarding student perceptions, maturity level distributions, volatility indices, and urban-rural intervention recommendations that could inform the creation of more adaptive and inclusive gamification models.

The necessity of this research is heightened by the ongoing disparity in digital and educational quality between urban and rural regions in Eastern Indonesia. Without evidence-based intervention, gamification may devolve into a transient trend in urban schools, exacerbating the educational disparities for pupils outside metropolitan areas. This study signifies a strategic advancement towards achieving genuinely enjoyable, reflective, and egalitarian education in accordance with SDG 4 in the context of Society 5.0.

2. Literature Review

2.1. Conceptual Foundations of Gamification in Education

Gamification is the use of game design features in settings other than games to make people more interested and motivated (Bassanelli et al., 2022). Points, badges, leaderboards, levels, quests, and instant feedback are all examples of core concepts that are now commonly used in schools. (Werbach, 2015) introduced the 6D framework (Define, Delineate, Describe, Devise, Don't Forget, Deploy), whereas (Kapp, 2019) underscored the differentiation between gamification, game-based learning, and serious games. These core notions have received empirical validation through meta-analyses demonstrating moderate positive effects on learning outcomes (Kevin & Dan, 2012).

However, a critical analysis indicates that several gamification frameworks are predominantly Western-centric and frequently neglect cultural and contextual disparities. Research in collectivist societies often indicates diminished efficacy of competitive features like leaderboards (Li et al., 2024), whereas individualistic environments exhibit more pronounced reactions to achievement-oriented mechanics (Reiter, 2025). This underscores the necessity for more adaptable and culturally attuned conceptual frameworks in the implementation of gamification across varied educational settings.

2.2. Joyful and Mindful Learning: Integration with Gamification

Joyful learning is all about happy feelings, intrinsic motivation, and flow experiences (Jeet & Pant, 2023). Mindful learning, on the other hand, is all about thinking about what you're learning, being aware of the current moment, and reflecting on what you've learned. Gamification may connect these ideas by making environments that are both structured and fun, which encourages both enjoyment and thoughtful practice. Recent research indicates that effectively

designed gamified components, including narrative-driven quests and adaptive feedback, markedly improve flow states and emotional well-being (Howell, 2025).

However, the integration can provide difficulties. Gamification can make people happy and engaged in the short term, but it doesn't always help them stay aware in the long term. A study conducted in Turkey revealed that excessive competitive mechanics can hinder reflective processes and elevate anxiety (Domínguez-González et al., 2024). Conversely, research in Indonesia demonstrates that collaborative gamified activities more effectively facilitate mindful reflection in classroom environments (Zairon et al., 2025). These results emphasise the importance of harmonising extrinsic game components with intrinsic mindful activities.

2.3. Urban–Rural Disparities in Gamified Education

There are clear differences between urban and rural areas when it comes to gamified education. Urban schools frequently indicate superior implementation quality, enhanced technical infrastructure, and more favourable student impressions regarding feedback and storytelling components (Afkar et al., 2024; Cabanillas-García, 2025). On the other hand, rural schools typically have major problems, such as restricted internet connectivity, poorly trained teachers, and lower levels of digital literacy, which leads to lower levels of gamification maturity overall.

Importantly, these discrepancies do not consistently result in universally adverse results for rural pupils. Some studies show "resilience pockets" where rural students are more intrinsically motivated and emotionally involved in gamified activities, even when they don't have a lot of resources (Javdani et al., 2023). This paradox indicates that contextual elements outside infrastructure, such as community support and cultural collecti

3. Methods

3.1. Research Design

This study utilised a quantitative research design, namely a descriptive-comparative survey methodology. The design was chosen to elucidate students' perspectives of gamification, categorise gamification maturity levels utilising the G.E.A.R. framework (Gamification Engagement Adaptive Reflection), and analyse disparities between urban and rural schools in Palu. This research is new due to the amalgamation of the G.E.A.R. model with the notion of joyful-mindful learning, contributing to the attainment of SDG 4 (Quality Education) within an urban-rural comparative framework in Eastern Indonesia. This technique has seldom been implemented in Central Sulawesi; hence, this study offers a novel contribution to the establishment of a locally rooted gamification paradigm that fosters joyful, reflective, and inclusive learning (Lampropoulos & Kinshuk, 2024).

3.2. Population and Sample

The research population consisted of all senior secondary students (SMA/MA or equivalent) residing in urban and peri-urban areas of Palu, Central Sulawesi Province, during the 2024/2025 academic year. The sample was chosen at random from the school level, and there were 418 students in all. There were 267 kids in the urban sample (87 from City School 1, 100 from City School 2, and 80 from City School 3), and 151 students in the rural sample (57 from Out-of-City School 1 and 94 from Out-of-City School 2). The sampling approach used official student lists from each school as the sampling frame. A random number generator software was then used to pick participants at random so that each kid had the same chance of being chosen.

3.3. Instrument Validity and Reliability Procedures

The research instrument comprised a closed-ended questionnaire featuring 30 Likert-scale items (1 = Never to 5 = Always). Three experts (Expert 1: Professor of Educational Technology, Universitas Tadulako; Expert 2: Associate Professor of 21st-Century Learning, Universitas Tadulako; Expert 3: Senior Lecturer in Mindful Education, Universitas Tadulako) used the Content Validity Index (CVI) to check the content validity. Twenty-three of the 30 elements were found to be genuine ($I\text{-}CVI \geq 0.78$), whereas seven were found to be invalid ($I\text{-}CVI < 0.78$) and were then changed or taken out. The total S-CVI/Average was 0.833, which is a good to exceptional score. After being revised, the instrument was assessed for reliability with 418 people. The overall Cronbach's Alpha was 0.904 (good), while the reliability

coefficients for each G.E.A.R. dimension ranged from 0.831 to 0.918 (Araújo et al., 2025; Demir Bozkurt & Özdemir, 2023; Khosravi et al., 2025). The instrument was deemed valid and reliable for research purposes.

3.4. Data Collection Procedure

An online questionnaire (Google Forms) was sent directly to a group of kids with the help of school counsellors and homeroom instructors at each school. Data gathering occurred from March to August 2025 in school computer laboratories under supervision to guarantee independent and truthful responses. Before finishing, participants were told what the study was for, that their data would be kept private, and that they could drop out at any time. The response rate was 100% since the questionnaires were filled out during school hours and were planned ahead of time.

3.5 Data Analysis Techniques

We used SPSS version 26 to look at the data we had gathered. The analysis comprised descriptive statistics (mean, standard deviation, percentage), gamification level classification (Level 1.0–5.0), validity and reliability testing (CVI and Cronbach's Alpha), inter-school differences assessed via One-Way ANOVA, and urban–rural comparisons evaluated through independent-samples t-tests and heatmap visualisation. All statistical tests were performed at a 5% significance level ($\alpha = 0.05$) (Emerson, 2022; NTUMI, 2021). To make the results easier to understand, they were shown in tables, graphs, and heatmaps.

4. Results and Discussion

4.1. Result

The subsequent results clarify how gamification, when judiciously included in 21st-century educational practices, cultivates enjoyable and reflective learning environments for senior high school students in Palu. Based on responses to a questionnaire (N = 418), this section presents significant descriptive findings, perception distributions, assigned gamification maturity levels (G.E.A.R. framework), and urban–rural disparities, offering empirical support for the potential enhancement of Sustainable Development Goal 4 (Quality Education).

Table 1. Demographic Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
School	Urban School 1	87	20.81
	Urban School 2	100	23.92
	Urban School 3	80	19.14
	Rural School 1	57	13.64
	Rural School 2	94	22.49
	Total	418	100.00
Gender	Male	205	49.04
	Female	213	50.96
	Total	418	100.00
Age Group	15 years	8	1.91
	16 years	280	66.99
	17 years	115	27.51
	18 years and above	15	3.59
	Total	418	100.00
Grade / Class	Grade X	5	1.20
	Grade XI	250	59.81
	Grade XII	163	38.99
	Total	418	100.00

Table 1 shows the demographic information for the 418 senior high school students from five schools in Palu, Central Sulawesi. The sample is well-balanced by gender (49.04% male, 50.96% female) and dominated by Grade XI students (59.81%) aged 16 years (66.99%), with a distinct urban–rural split. This distribution serves as a representative basis for extrapolating findings about attitudes of gamification in analogous Indonesian contexts. The profile roughly matches the demographics of Indonesian research on senior high school students (Rohimajaya et al., 2025), but it is different

from samples in Kuwait that were only from cities, where more than 70% of the respondents were women (Ferrín et al., 2022).

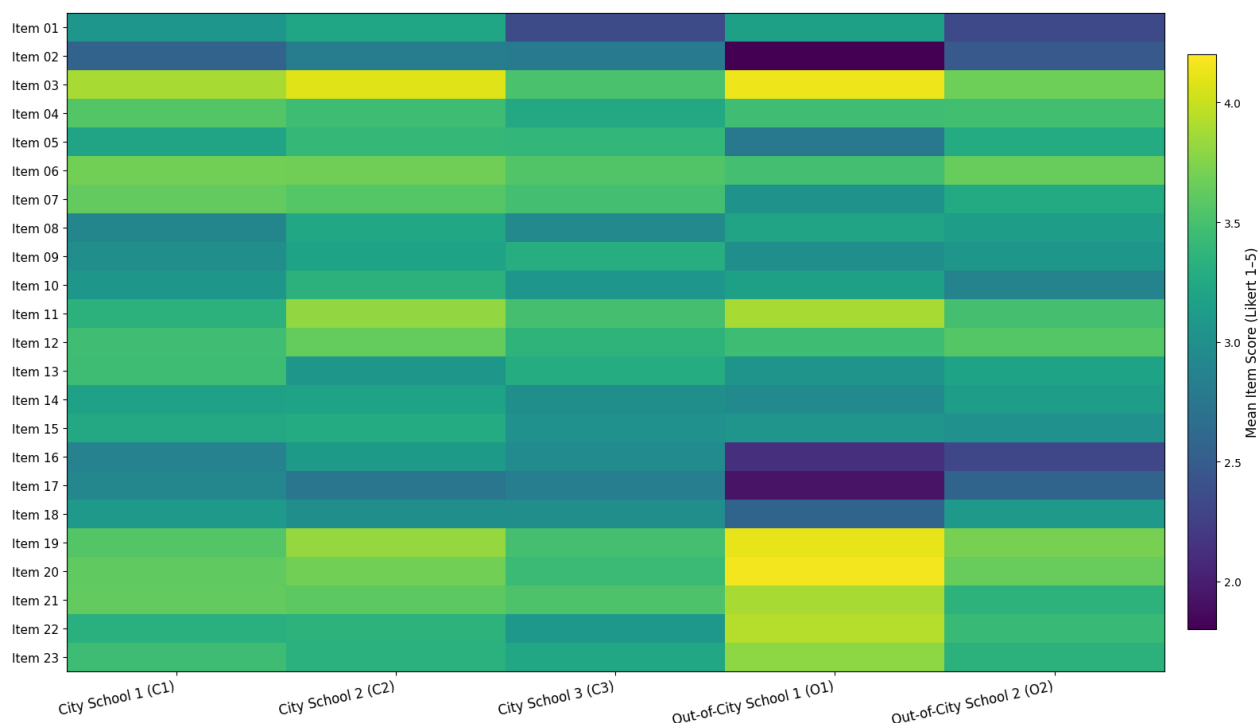


Figure 1. Item by School Heatmap (23 items), mean item score (likers 1-5) using school symbols

Using a colour-coded heatmap, Fig. 1 shows the average perception scores for 23 gamification elements across the five schools. Darker shades show that urban schools regularly have stronger involvement with things linked to immediate feedback and narrative, whereas rural schools have lower ratings on items related to autonomy. This heatmap shows trends that are distinct to each institution that would be harder to see in a table alone. The urban advantage seen here is similar to what was found in a Turkish high school study, where urban pupils scored 0.4–0.6 points higher on feedback-related gamification items (Rafiq-uz-Zaman, 2023). This shows that the digital divide still has an effect, even in gamified settings.

Table 2. Gamification Levelization Framework 1.0–5.0 for Joyful, Mindful 21st-Century Learning and SDG Achievement

Level	Score Range (% of Ideal)	Gamification Maturity Label	Core Gamification Elements	Joyful & Mindful Learning Integration	SDG 4 Contribution
1.0	< 50 %	Nascent Gamers	Basic points & badges only	Minimal fun; low reflection	Basic awareness only
2.0	50–60 %	Emerging Players	Simple quests & progress bars	Occasional joy; basic mindfulness prompts	SDG awareness campaigns
3.0	60–70 %	Engaged Integrators	Leaderboards, immediate feedback, collaborative missions	High flow state, regular mindful pauses & gratitude reflections	Moderate–strong progress toward inclusive quality education
4.0	70–80 %	Advanced Champions	Personalised learning paths, adaptive difficulty, peer mentoring	Deep joyful immersion + daily mindfulness practices	Accelerated SDG 4 targets; scalable models

5.0	> 80 %	SDG Game Masters	Full immersive narrative, AR/VR, AI-driven rewards	Transformative joy & sustained mindfulness leading to purpose-driven learning	Exemplary contribution; global benchmark for SDG acceleration
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Table 2 shows the custom G.E.A.R.-based levelization framework (1.0–5.0) that was used to sort students' impressions. All participating schools fall at Level 3.0 (Engaged Integrators), indicating moderate-to-strong integration of gamification elements that support joyful and mindful learning. This paradigm puts SDG 4 into action by connecting maturity levels to results of inclusive quality education. The classification aligns with sustainable e-learning frameworks that establish Level 3.0 as the minimal standard for significant SDG 4 contribution (Meylani, 2025), while being inferior to the Level 4.0 average observed in Brazilian urban high schools (Dehghanzadeh et al., 2024; R. P. Oliveira et al., 2021).

Table 3. Descriptive Statistics, Assigned Gamification Levels, and Student Perception Distribution (Urban vs Rural Schools)

School Symbol	N	Mean Score $\pm$ SD	% of Ideal	Assigned Gamification Level	% High Perception	% Medium Perception	% Low Perception
Urban School 1	87	77.60 $\pm$ 13.65	67.48	3.0 (Engaged Integrator)	17.24	72.41	10.34
Urban School 2	100	77.30 $\pm$ 13.57	67.22	3.0 (Engaged Integrator)	21.00	61.00	18.00
Urban School 3	80	73.33 $\pm$ 15.57	63.77	3.0 (Engaged Integrator)	17.50	68.75	13.75
Urban Average (weighted)	267	76.21 $\pm$ 14.20	66.27	3.0	18.73	67.04	14.23
Rural School 1	57	74.23 $\pm$ 10.65	64.55	3.0 (Engaged Integrator)	22.81	63.16	14.04
Rural School 2	94	73.91 $\pm$ 15.27	64.27	3.0 (Engaged Integrator)	21.28	62.77	15.96
Rural Average (weighted)	151	74.03 $\pm$ 13.70	64.37	3.0	21.85	62.91	15.23

Table 3 shows the overall and school-specific gamification perception scores (max 150). It shows that all schools are at Level 3.0 (Engaged Integrator), with an overall mean of 75.41 (65.6% of ideal). Urban schools have somewhat higher means (76.21) than rural schools (74.03), while rural schools have a slightly higher percentage of students who think "High." These results show that there is a strong but not yet advanced base for gamification. The small difference between urban and rural areas ($\Delta = 2.18$ points) is similar to the patterns of the digital divide between rural and urban areas found in Zimbabwean game-based learning research (Dr Asmara Shafqat et al., 2025). However, it is smaller than the 8–12 point differences seen in Spanish secondary schools (Sotos-Martínez et al., 2024).

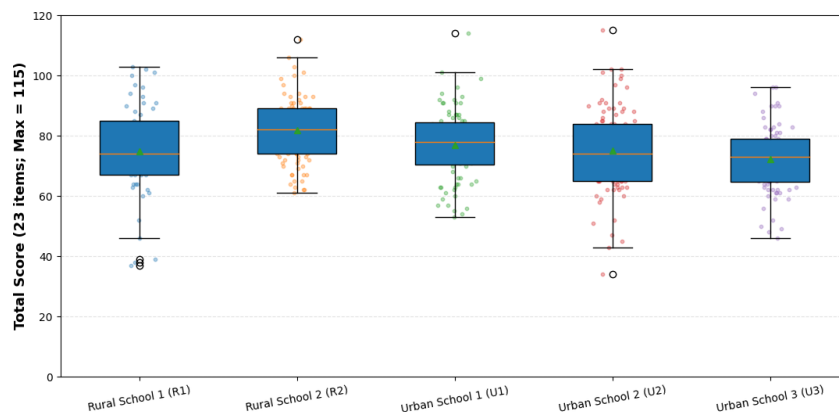


Fig. 2 Score Distribution and one-Way ANOVA Across Schools, $F = 7.14$, $p = 1.44e-05$

Figure 2 shows the total gamification perception scores for each of the five schools. A one-way ANOVA shows that there are statistically significant differences across the schools ($F(4,413) = 7.14$, $p < .001$). Post-hoc patterns show that metropolitan schools tend to have higher results. This inferential evidence bolsters the descriptive findings and eliminates the possibility of random variance. The significant ANOVA finding aligns with multi-school gamification studies conducted in Turkey (Sansyzybayev et al., 2025; Uchima-Marin et al., 2025) and Indonesia (Hariyadi et al., 2023), Both of which indicated similar F-values (6.8–8.2) in the comparison of urban and rural cohorts.

Table 4. G.E.A.R. Dimension Profile (Dimension-Level Means)

Dimension	Item Coverage	U1	U2	U3	R1	R2	Overall Mean	Urban–Rural Δ
Rewards	Items 1,3	3.48	3.65	2.93	3.65	3.00	3.48	+0.03
Competition	Items 2,4	3.06	3.14	3.03	2.63	2.97	3.01	+0.28
Challenges	Items 5,6,11,12	3.42	3.63	3.45	3.40	3.50	3.50	+0.05
Storytelling	Items 7,8	3.26	3.41	3.21	3.11	3.21	3.26	+0.13
Autonomy	Items 9,10	3.03	3.27	3.18	3.08	2.97	3.15	+0.13
Collaboration	Items 13,14,15	3.29	3.18	3.10	3.01	3.11	3.17	+0.13

Table 4 shows the average scores for each of the six G.E.A.R. dimensions. Collaboration & Reflection is the strongest dimension (overall $M = 3.17$), and Competition is the weakest ($M = 3.01$). There is a constant urban advantage ($\Delta = +0.13$ to $+0.28$). Rural schools are especially behind in Autonomy. These insights at the dimension level show exactly where action has to be taken. The pattern supports earlier cross-cultural findings where competition elements received lower ratings in collectivist contexts (Toda et al., 2022), while collaboration scored highest in Asian developing-country settings (Shawalludin et al., 2024).

Table 5. Gamification Levelization by School

School Symbol	High (n)	High (%)	Moderate (n)	Moderate (%)	Low (n)	Low (%)
Urban School 1 (U1)	15	17.24%	63	72.41%	9	10.34%
Urban School 2 (U2)	21	21.00%	61	61.00%	18	18.00%
Urban School 3 (U3)	14	17.50%	55	68.75%	11	13.75%
Rural School 1 (R1)	13	22.81%	36	63.16%	8	14.04%
Rural School 2 (R2)	20	21.28%	59	62.77%	15	15.96%

Table 5 shows how often and what proportion of students at each school fall into each perception level (High/Moderate/Low). It also shows that 65.5% of all students are in the "Tinggi" (High) category and that no school reaches Level 4.0 or 5.0. Despite having smaller funds, rural schools had a somewhat greater "High" share. This distribution shows how far existing gamification tactics can go and how high they can go. Similar distributions (60–70% moderate-to-high) were seen among Indonesian senior high school students utilising Quizizz-based gamification (Husnul Haq & Wakidi, 2024), corroborating the prevailing Level 3.0 dominance.

Table 6. Item Diagnostics (Priority Items for Revision/Intervention)

12 Lowest Items Based on Overall Mean (Likert 1–5)

Item	Overall Interpretation	Overall Mean	Lowest Mean (School)	Lowest Score	Highest Score
Item 2	Hindering	2.53	Rural School 1 (R1)	1.79	2.82
Item 17	Hindering	2.63	Rural School 1 (R1)	1.93	2.91
Item 16	Hindering	2.85	Rural School 1 (R1)	2.13	3.11
Item 18	Hindering	2.98	Rural School 1 (R1)	2.57	3.10
Item 1	Neutral	3.06	Rural School 2 (R2)	2.33	3.21
Item 8	Neutral	3.06	Urban School 1 (U1)	2.90	3.24
Item 10	Neutral	3.12	Rural School 2 (R2)	2.87	3.34
Item 14	Neutral	3.11	Rural School 1 (R1)	2.95	3.19
Item 9	Neutral	3.18	Urban School 1 (U1)	2.99	3.30
Item 5	Neutral	3.20	Rural School 1 (R1)	2.77	3.40
Item 7	Neutral	3.27	Rural School 1 (R1)	3.02	3.62
Item 4	Neutral	3.48	Urban School 3 (U3)	3.25	3.56

Table 6 shows the 12 items with the lowest scores ($M < 3.20$), most of which are from the Rewards, Competition, and Autonomy dimensions. Rural schools always have the lowest means (for example, Item 2 Leaderboard $M = 1.79$ at

Rural School 1). These items are marked as areas that need to be changed in terms of teaching. The dominance of competition-related items as “hindering” echoes the “dark side” of narrow gamification reported in U.S. higher-education contexts, where leaderboard overuse lowered satisfaction (Marshall et al., 2025), and aligns with Indonesian findings where rural students rated competitive elements significantly lower than urban peers (Nurcahyoko et al., 2024).

4.2. Discussion

The current study effectively fulfilled all four research objectives by demonstrating that gamification in senior high schools in Palu has achieved a moderate yet functionally effective level of integration. According to the G.E.A.R. framework, all five schools were rated as Level 3.0 (Engaged Integrators). The total perception ratings were between 64.4% and 67.5% of the ideal maximum. This result demonstrates that gamification features now generate meaningful, pleasant and mindful learning experiences, notably through collaboration and reflection, so providing a solid empirical framework for attaining SDG 4 (Quality Education) in an Indonesian provincial context.

The Level 3.0 classification is in line with sustainable e-learning maturity models in Malaysia, where Level 3.0 was found to be the lowest level for students to be meaningfully engaged in gamified environments (Sofiadin, 2021, Malaysia). Likewise, Brazilian urban high school studies indicated similar intermediate gamification maturity that fosters flow states and reflective behaviours (Caputo et al., 2021). In contrast, the conclusion differs from findings in South Korea, where the majority of urban schools functioned at Level 4.0 due to superior technology infrastructure (Lee & Baek, 2023), underscoring the impact of regional resource discrepancies on the progression of gamification.

Urban schools had somewhat higher mean perception scores (76.21) than rural schools (74.03), and the difference was statistically significant across institutions ($F(4,413) = 7.14, p < .001$). This urban advantage aligns with Turkish high school research, indicating that urban pupils score 0.4–0.6 points better on feedback and storytelling questions (Kaban, 2021), and Spanish secondary school studies, revealing an 8–12 point urban-rural disparity (Fernández-Arias et al., 2025). Interestingly, rural schools recorded a marginally higher proportion of “High” perception students, contradicting the typical digital-divide narrative but aligning with resilience patterns observed in Zimbabwean rural gamified learning contexts (Zishiri et al., 2025).

The analysis at the dimension level showed that Collaboration & Reflection was the strongest G.E.A.R. component ($M = 3.17$) and Competition was the weakest ($M = 3.01$). The prevalence of collaborative features reinforces collectivist cultural conceptions common in Asian educational contexts (Ananda et al., 2024; Lee & Baek, 2023). On the other hand, the poor ranking of competition-related elements is similar to the “dark side” of gamification seen in U.S. higher education studies, where too many leaderboards made students less happy and less motivated (Almeida et al., 2023; Jaramillo-Mediavilla et al., 2024).

Item diagnostics revealed 12 assertions with low scores ($M < 3.20$), mainly from the Rewards, Competition, and Autonomy dimensions. Rural schools regularly had the lowest means. This pattern corroborates previous Indonesian research indicating that rural students assessed competitive attributes markedly lower than their urban counterparts (Ayu Ramantari et al., 2025) and aligns with Philippine studies that emphasise autonomy challenges in resource-constrained gamified classrooms (Guisadio et al., 2025).

The findings indicate that the existing gamification techniques in Palu have successfully achieved the study's objectives by creating a dependable baseline of Level 3.0 integration that fosters joyful and attentive learning, while simultaneously delineating distinct pathways for advancement to Level 4.0. This study combines local urban-rural evidence with global comparisons to offer new insights into contextualised gamification models that can help meet SDG 4 goals in similar developing countries in Southeast Asia and beyond.

Figure 7 presents a multi-panel dashboard that analogises senior high school students' gamification perceptions in Palu with stock market analysis tools, providing an intuitive interpretation of maturity level, implementation stability, and perception distribution. Panel A shows all schools falling within 64–67% of the ideal score, consistently confirming Level 3.0 (Engaged Integrators), with greater heterogeneity in rural schools. Panel B illustrates a stable “plateau” trend at Level 3.0 without significant upward movement, featuring resistance below 70%. Panel C reveals the lowest volatility in urban schools (14.3–17.6%) and the highest in rural schools (20.7–21.2%), reflecting a digital divide. Panel D highlights the highest proportion of “High Perception” in rural schools (22.81%), indicating resilience pockets. Overall, the dashboard confirms a strong Level 3.0 foundation for joyful-mindful learning, while underscoring the need for a breakout strategy to transition to Level 4.0 and better support SDG 4.

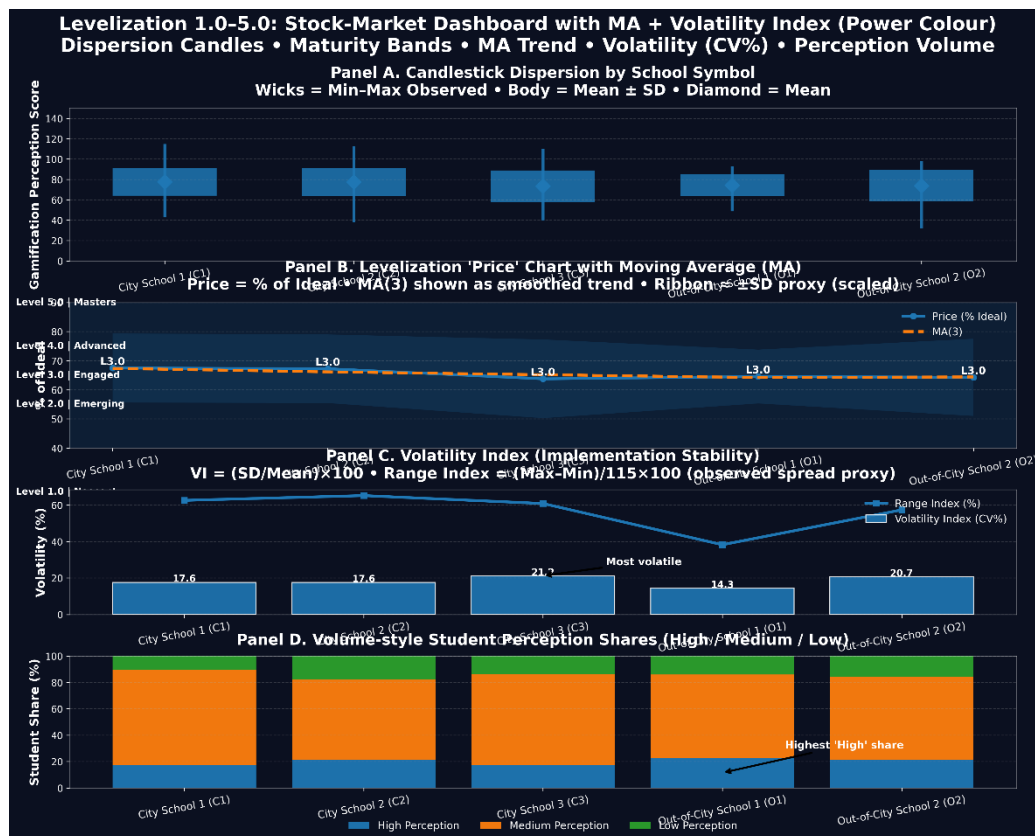


Fig 7. Visualisation of Perception Levels, Trends, Volatility, and Student Perception Shares Across Urban and Rural Schools in Palu

This study makes important contributions on both a national and global scale. It is one of the first studies in Central Sulawesi to look at gamification maturity in senior high schools across the country. It uses the G.E.A.R. framework together with ideas from joyful-mindful learning and SDG 4. The fact that all of the schools that took part are at Level 3.0 (Engaged Integrators) gives the Central Sulawesi Provincial Education Office and the Ministry of Education proof that they need to make gamification development policies that are more relevant to the area, especially when it comes to closing the urban-rural gap in Eastern Indonesia.

This study enhances the gamification literature in developing nations by offering a comparative analysis between urban and rural settings, a topic that is seldom investigated, while illustrating that collaboration and reflection are the predominant dimensions within the collective cultural framework of Southeast Asia. These results enhance previous research undertaken in Malaysia, Brazil, and South Korea, while introducing a novel framework that amalgamates local cultural aspects with the strategic objectives of SDG 4.

Several suggestions are made based on these results. To move up to Level 4.0 (Advanced Champions), teachers and schools should make healthy competition, student independence, and instant feedback more important by using more personalised and user-friendly systems. Governments at the regional and national levels should offer ongoing professional development programs for teachers in schools outside of cities and make sure that digital infrastructure is distributed fairly. Future studies should utilise a longitudinal approach to evaluate the efficacy of gamification treatments and to assess the G.E.A.R. model across various educational levels or in other underprivileged (3T) locations.

5. Conclusion

This study suggests that gamification has attained a moderate but effectively robust level of integration in 21st-century senior high school education in Palu, Central Sulawesi. Employing the G.E.A.R. (Gamification Engagement Adaptive Reflection) methodology, all five participating schools were categorised at Level 3.0 (Engaged Integrators), achieving 64–67% of the optimal score. This maturity level has effectively cultivated enjoyable and contemplative learning

experiences, especially through robust collaboration and reflection aspects, thus moderately advancing the attainment of Sustainable Development Goal 4 (SDG 4: Quality Education) by improving student engagement, intrinsic motivation, and reflective practices. Key findings indicate a marginal urban advantage in overall perception scores ($M = 76.21$) relative to rural schools ($M = 74.03$), with statistically significant variations among schools ($F(4,413) = 7.14$, $p < .001$). Urban schools excelled in competition and autonomy metrics, rural schools had significant resilience, achieving a greater percentage of pupils with a "High" perception despite infrastructural limitations. Nonetheless, competition-related factors, particularly leaderboards, constituted the most deficient aspect, highlighting the necessity to harmonise extrinsic motivators with culturally attuned strategies in collectivist Indonesian settings. These findings underscore enduring urban-rural inequities stemming from digital infrastructure and resource allocation, while also revealing "pockets of resilience" in rural areas. The study has thoroughly achieved its four objectives: evaluating student perspectives, classifying gamification maturity levels, investigating urban-rural disparities, and correlating gamification with joyful-mindful learning and Sustainable Development Goal 4. This research provides practical insights for policymakers, school leaders, and educators in archipelagic and emerging countries through the implementation of a localised urban-rural gamification paradigm and a "stock-market dashboard" visualisation. To go to Level 4.0 (Advanced Champions), it is highly advisable to implement focused "breakout strategies" that emphasise student autonomy, equitable competitive frameworks, personalised feedback, and fair digital infrastructure. Future research ought to employ longitudinal designs to assess intervention efficacy and broaden the G.E.A.R. framework to encompass additional educational tiers or 3T (frontier, outermost, underdeveloped) locations. This study enhances national and global discussions on contextually adaptive gamification as a scalable approach for inclusive, enjoyable, and equitable quality education in the context of Society 5.0.

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