

Gamificación y aprendizaje basado en retos (ABR): estrategias motivacionales y desarrollo de habilidades blandas en la Generación Z

Gamification and Challenge-Based Learning (CBL): Motivational Strategies and Development of Soft Skills in Generation Z

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Resumen: El presente estudio analiza la efectividad de la gamificación y el aprendizaje basado en retos (ABR) como estrategias pedagógicas orientadas a la Generación Z. A través de un enfoque cuantitativo no experimental, se evaluaron variables como motivación, autonomía, trabajo en equipo y resolución de problemas, correlacionándolas con el rendimiento académico de estudiantes expuestos a metodologías activas. Los resultados evidencian una fuerte relación entre motivación y autonomía con el desempeño académico, mientras que el trabajo en equipo y la resolución de problemas muestran efectos moderados. Se concluye que estas metodologías no solo incrementan el compromiso estudiantil, sino que favorecen el desarrollo de habilidades blandas clave para el siglo XXI. El estudio resalta la necesidad de adaptar los entornos educativos a las preferencias digitales de la Generación Z y promueve la formación docente continua para implementar estas estrategias con eficacia.

Palabras Clave: Gamificación, aprendizaje basado en retos, Generación Z, motivación, habilidades blandas.

Abstract: This study examines the effectiveness of gamification and challenge-based learning as pedagogical strategies tailored to Generation Z. Using a non-experimental quantitative approach, variables such as motivation, autonomy, teamwork, and problem-solving were assessed and correlated with the academic performance of students exposed to active methodologies. Results reveal a strong relationship between motivation and autonomy with academic achievement, while teamwork and problem-solving show moderate effects. The findings suggest that these methodologies not only enhance student engagement but also foster the development of essential soft skills for the 21st century. The study highlights the importance of adapting educational

environments to the digital preferences of Generation Z and emphasizes the need for ongoing teacher training to ensure effective implementation of these strategies.

Keywords: Gamification, challenge-based learning, Generation Z, motivation, soft skills.



1. Introduction

Contemporary education is located at an inflection point. This responds to the social, cultural, and technological changes that characterize the 21st century. Among these changes, the emergence of Generation Z in educational systems has called into question traditional teaching methodologies. This generation was born around 1995 and 2010 and has grown immersed in a digital environment, with immediate access to information, a marked familiarity with technological devices, and a way of interacting with the world based on immediacy, visuality, and connectivity. As a consequence, their learning styles, communicative preferences, and levels of attention differ considerably from those of past generations. This has created new challenges for educators and curriculum designers.

Traditional pedagogical strategies, centered on the unidirectional transmission of content and rote learning, are insufficient to capture students' sustained attention and promote meaningful learning. Generation Z demands active learning experiences that are personalized and have a clear objective. Additionally, these experiences need to integrate technology, allow autonomy, foster creativity and connection with the world. In this context, it becomes necessary to rethink the didactics and adopt more motivating approaches, such as gamification and challenge-based learning (CBL). These approaches favor both commitment and the development of key competences for life in society.

Gamification involves applying elements typical of game design to non-ludic contexts, such as educational settings, to increase motivation, engagement, and academic achievement. Resources such as points, medals, levels, rankings, missions, or rewards act on the brain's reward system. This fact provokes an immersive experience that transforms the learning process into an interactive adventure. Various studies have shown that these dynamics not only improve attitudes toward face learning but also reinforce content retention, strengthen critical thinking, and promote collaborative work.

For its part, challenge-based learning (CBL) advocates an active pedagogy in which students confront real or simulated problems that must be solved through research, analysis, collaboration, and decision-making. This approach promotes student agency, empowers autonomy, and strengthens skills such as creativity, problem-solving, leadership, and ethics. Moreover, it allows for contextualizing knowledge, which is particularly valuable for a generation that prioritizes the practical applicability of what is learned and its connection to social and environmental causes.

The integration of gamification and challenge-based learning (CBL) in educational settings aligns with the principles of neuroeducation and motivational psychology, fostering intrinsic motivation by satisfying three fundamental needs: autonomy, competence, and connection. Furthermore, the use of digital platforms, mobile apps, immersive environments such as the Metaverse, and artificial intelligence in the design of gamified learning experiences results in greater personalization, immediate feedback, and adaptability to the rhythm and each student's style.

However, the effective implementation of these methodologies requires overcoming structural and pedagogical challenges, such as teacher training in digital competencies,

ensuring technology availability in contexts with access gaps, and developing curricular planning that coherently integrates these approaches. Overcoming such obstacles is essential if Generation Z's needs are to be addressed efficiently and if students are to become motivated, autonomous, critical, and able to thrive in complex, changing scenarios.

In this framework, the present study aims to analyze how gamification and challenge-based learning (CBL) serve as motivational strategies key to teaching Generation Z. It highlights their theoretical foundations, observed benefits, practical applications, and the challenges involved in their implementation across different educational contexts.

State of the Art

The evolution of educational environments in the XXI century requires an urgent methodological adaptation regarding the particularities of Generation Z. This generation, formed in the digital era, has transformed the way of learning, interacting, and building knowledge. This has generated a clear distancing from the traditional pedagogic models. In response to these new demands, scientific literature has addressed the use of strategies such as gamification and challenge-based learning (CBL) with increasing interest, considering that these approaches not only increase students' motivation and engagement but also make it easy to develop key 21st-century skills such as critical thinking, creativity, and problem-solving.

Below are the most relevant thematic axes identified in recent studies on this topic:

- I. Educational characteristics of Generation Z**
Generation Z demands interactive, practical, and highly personalized educational experiences. This generation's familiarity with digital media, short attention spans, and preference for audiovisual content demand active methodologies that break with the traditional transmissive approach. (Čekrljija, 2024; Vinh, 2020; Atmaja & Khalid, 2023).
- II. Foundations of gamification in education**
Gamification has demonstrated increased motivation and participation by incorporating game dynamics into the learning process. Studies report meaningful improvements in knowledge retention and academic performance, as well as in students' intrinsic motivation (Ramos et al., 2024; Gorai, 2024; Smirani & Yamani, 2024).
- III. Challenge-based learning and critical thinking**
The CBL proposes an active pedagogy centered on solving real problems, which favors the development of cognitive, social, and ethical competences. It aligns with Generation Z expectations for meaningful, collaborative, and socially impactful experiences (Poluru, 2024; "A critical analysis...", n.d.).
- IV. Emergent technologies integration**
The incorporation of new technologies such as AI, microlearning, augmented reality, or the Metaverse allows personalizing the learning process and making it more attractive. These tools reinforce active methodologies that align with

the digital habits of Generation Z (Saptiany et al., 2024; Lyu & Park, 2024; Savithri et al., 2024).

V. Challenges for the implementation

Structural obstacles persist, such as digital gaps, limited teacher training in active methodologies, and inadequate design of a gamified environment. Overcoming these challenges is key to sustainable and effective adaptation. (Islawati et al., 2025; Wulan et al., 2024; Bucăța, 2023).

Table 1

Summary of authors and contributions

Thematic Axe	Author(s) and Year	Main Contribution
Characteristics of Generation Z	Čekrljija (2024), Vinh (2020)	They identify digital preferences and personalized learning needs.
	Atmaja & Khalid (2023), Chicca & Shellenbarger (2018)	Generation Z-specific educational demands.
Foundations Gamification	Ramos et al. (2024), Gorai (2024)	Gamification improves motivation, retention, and academic performance.
	Smirani & Yamani (2024), Ilmiyah (2024)	Ludic elements impact Kahoot! in different educational levels.
Challenge-based Learning (CBL)	Poluru (2024), "A critical analysis..." (n.d.)	Development of critical and ethical thinking through educational challenges.
	Agarwal (n.d.)	Application of the CBL in diverse educational contexts.
Emerging Technologies	Saptiany et al. (2024). Savithri et al. (2024)	Use of microlearning, AI, and digital platforms for gamification.
	Lyu & Park (2024), Li et al. (2023)	The metaverse and immersive environments as pedagogical allies.
Implementation challenges	Islawati et al. (2025). Wulan et al. (2024)	Technological, pedagogical, and digital equality challenges.
	Bucăța (2023), Кадлубович et al. (2020)	Teacher training required and permanent curriculum updating.

2. Methodology

To address the educational phenomena of gamification and challenge-based learning (CBL) as motivational strategies for Generation Z, a quantitative approach has been chosen, as it allows for the objective measurement and analysis of perceptions, motivation levels, and students' degree of commitment through observable variables. The study is based on a non-experimental, descriptive-correlational design, as it aims to observe the characteristics and relationships between variables in their natural context without directly manipulating them.

Participant selection was conducted using non-probabilistic convenience sampling, as students were selected from those who were exposed to active learning experiences, particularly through gamification and challenge resolution, during the academic year 2025. This sampling modality is used in exploratory educational research, where access to the population depends on the population's availability and the intervention's real-world context.

The data collection technique was a digital survey administered via a structured form with a Likert scale to measure variables such as motivation, perceived effectiveness, and student engagement. This efficient, anonymous, and scalable technique allowed for the easy collection of data from multiple participants.

The statistical treatment was carried out using specialized software, applying descriptive statistics to characterize the data, correlational tests to explore relationships among variables, and normality tests and analysis of variance to test for differences among subgroups. These tools ensure the validity and reliability of the results obtained.

Table 2

Methodology

Methodological component	Description
Approach	Quantitative
Research Design	Non-experimental, descriptive, and correlational
Population	College students of Generation Z (17–23 years old) in the context with active methodologies
Sample	120 students selected by non-probabilistic sampling for convenience
Data collection technique	Digital structured survey
Instrument	Questionnaire with a 5-point Likert scale of 5 points, validated through expert review.
Main Variables	- Academic motivation- Student engagement- Perception of gamification and CBL
Statistical treatment	- Descriptive Statistics (means, standard deviations)- Normality tests- Spearman's correlation - ANOVA para comparar grupos
Software used	IBM SPSS v.26
Level of Significance	$p < 0.05$

The methodological table summarizes the main components of the research design. The quantitative approach allows the establishment of relationships among variables in a measurable and reproducible way. Non-experimental design implies that variables are not manipulated, but observed as they occur. Survey techniques are adequate for measuring subjective perceptions such as motivation or engagement, especially when working with large, geographically dispersed samples.

The use of Likert-type scales facilitates the quantification of participants' level of agreement with statements related to gamification and challenge-based learning (CBL). Finally, the proposed statistical analysis enables interpretation of the results with scientific rigor, providing evidence of the efficacy of these methodologies in addressing contemporary educational challenges.

3. Results and Discussion

To address the study's objectives and hypotheses, the results are presented in three sections: a descriptive analysis of the key variables, a correlational analysis between soft skills and

academic performance, and regression model estimates to evaluate the predictive power of those skills. All statistical tests were conducted at a significance level of $p < .05$. Moreover, atypical values were identified using Cook's distance, which helped ensure the robustness of the estimated models.

1. Descriptive analysis of the key variables

The descriptive analysis revealed moderately high levels of positive perception towards gamification and challenge-based learning (CBL), with a general mean of academic motivation of 4.12 (SD = 0.65) on a 5-point Likert scale. Regarding students' engagement, the mean was 4.05 (ED = 0.71), while the perceived effectiveness of the active methodologies was 4.18 (ED = 0.58). These values suggest favorable validation of the participants' perceptions of the implemented strategies.

2. Correlation between soft skills and academic performance

The Spearman correlation coefficient was used to examine the relationship between the self-reported soft skills (motivation, teamwork, autonomy, and problem-solving) and the students' final academic average. The results showed significant correlations between the motivation and the academic performance ($r_s = .44$, $p < .001$), as well as between the autonomy and performance ($r_s = .38$, $p < .01$). Teamwork also showed a moderate positive correlation ($r_s = .29$, $p < .05$). At the same time, problem solving presented a weaker correlation, although significant ($r_s = .24$, $p = .046$).

3. Models of linear regression: predictive power

To estimate the predictive power of soft skills for academic performance, a multiple linear regression model was fitted. The model resulted in statistically significant results ($F(4, 115) = 11.82$, $p < .001$), explaining 28.3% of the variance in academic performance ($R^2 = .283$). Inside the model, academic motivation was the strongest predictor ($\beta = .37$, $p < .001$), followed by autonomy ($\beta = .25$, $p = .003$). The variables for teamwork ($\beta = .12$, $p = .082$) and problem solving ($\beta = .09$, $p = .104$) were not significant, although they contributed marginally to the model.

The model assumptions were evaluated, confirming the normality of residuals, homoscedasticity, and absence of multicollinearity ($VIF < 2$). Furthermore, Cook's distance values were used to identify influential atypical values. It was determined that no cases exceeded the critical threshold ($D < 1$), so no observations needed to be excluded.

Table 3

Descriptive Results and Correlation with the Academic Performance

Variable	Median	Standard Deviation	Correlation with performance (r_s)	Significance (p)
Academic Motivation	4.12	0.65	0.44	< .001
Student engagement	4.05	0.71	—	—
Effectiveness perception	4.18	0.58	—	—
Academic average	8.44	0.84	—	—
Teamwork	4.01	0.67	0.29	< .05
Autonomy	4.10	0.61	0.38	< .01
Solving problems	3.98	0.74	0.24	.046

Table 3 presents the final descriptive results obtained in the study. On the whole, the variables assessed show high levels in students' perceptions, especially in academic motivation ($M = 4.12$; $SD = 0.65$), the perceived effectiveness of active methodologies ($M = 4.18$; $SD = 0.58$), and student engagement ($M = 4.05$; $SD = 0.71$). Furthermore, academic performance was 8.44 out of 10, indicating positive performance in the sample. The standard deviations were relatively low, indicating important consistency in participant responses. Regarding the correlational analysis, positive and statistically significant associations were found among some soft skills and academic performance. Academic motivation showed the strongest correlation ($r_s = 0.44$; $p < .001$), followed by autonomy ($r_s = 0.38$; $p < .01$) and teamwork ($r_s = 0.29$; $p < .05$). Solving problems showed a weaker but significant correlation ($r_s = 0.24$; $p = .046$). On the other hand, variables such as student engagement and perception of effectiveness did not evidence significant correlations with academic performance, even though they had high means. This suggests that their influence could be mediated by other factors contemplated in this analysis. Altogether, these findings support the hypothesis that certain soft skills, such as motivation and autonomy, contribute significantly to academic success in educational contexts that incorporate active methodologies such as gamification and challenge-based learning (CBL).

4. Conclusions

The results of the present study confirm the importance of integrating active methodologies, such as gamification and challenge-based learning (CBL), into educational contexts for Generation Z. This cohort requires formative, dynamic, participatory, and technology-mediated environments. It was shown that academic motivation and autonomy are not only highly developed in this group of students but also significantly correlated with their academic performance, becoming key predictors of educational success in innovative environments.

These conclusions reinforce the argument that student-centered methodologies should go beyond the instrumental use of technology to become true pedagogical, transformative ecosystems that stimulate critical thinking, self-directed learning, and emotional self-regulation. While variables such as teamwork and problem-solving also showed a positive influence, their more limited impact suggests the need to design more structured, sustained-over-time strategies that effectively promote collaborative learning.

Likewise, the finding that student engagement and positive perceptions of active methodologies are not necessarily associated with improved academic performance invites a rethink of conventional indicators of educational success and a greater emphasis on the formative process itself rather than on grades. This implies reviewing evaluation systems, incorporating continuous feedback practices, and fostering more meaningful, contextualized learning.

From an applied perspective, this research provides empirical evidence to help teachers, academic administrators, and educational institutions promote active learning and personalized, adaptable environments that effectively respond to the interests, skills, and needs of Generation Z. However, it is recognized that the successful implementation of these methodologies requires overcoming challenges such as teacher training in techno-pedagogical competencies, the availability of digital infrastructure, and curricular redesign.

Finally, it is suggested that further research be conducted to deepen the analysis of mediating and moderating variables, use larger and more diverse samples, and combine quantitative and qualitative methods to explore the impact of gamification and CBL on the academic, emotional, and social development of 21st-century students in a more integrated way.

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CONFLICTS OF INTERESTS

The authors report no conflicts of interest.