Impact of Gamification on Teaching-Learning Criminal Law: A Quasi-Experimental Study with University Students

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Abstract – **Recent studies have highlighted the need for innovative teaching methods in legal education, particularly in criminal law. This research examines the impact of gamification on teaching General Criminal Law to university students. Building on previous literature demonstrating gamification's effectiveness in higher education, this study hypothesized that implementing educational games would significantly improve students' learning outcomes and engagement. Using a quasi-experimental design, the study involved 47 university students who participated in educational games including Legal-Historical Domino and Conceptual Cards over one academic semester. The research aimed to evaluate both cognitive improvements and student perceptions of the gamified approach. Results showed significant improvement in students' knowledge (d = 1.68, p < .001), with the "principles of law" dimension exhibiting the largest gain. Students reported highly positive perceptions of the ludic method, particularly its aid to learning (M = 4.57, SD = 0.58). Knowledge improvement correlated positively with perceived learning assistance (r = .45, p = .002). These findings suggest gamification can effectively enhance both academic performance and motivation in legal education, addressing key challenges in 21st-century law teaching.**

1. Introduction

Contemporary legal education faces significant challenges in training professionals capable of addressing the complexities of the current legal system [1], [2]. In particular, the teaching of criminal law requires innovative strategies that foster active and meaningful learning, overcoming the limitations of traditional methods primarily based on memorization and lecture-style teaching [3], [4].

Criminal law, defined as the branch of the legal system that regulates the punitive power of the state [5], plays a fundamental role in the training of future legal professionals. This discipline not only encompasses the study of crimes and punishments but also involves understanding fundamental principles, theories of crime, and complex procedural aspects [6]. The teaching of criminal law in the university context faces particular challenges due to its technical nature and the constant evolution of legislation and jurisprudence. Recent studies have pointed out the need to innovate in teaching methodologies to address these challenges. For example, [7] highlights the importance of implementing pedagogical strategies that foster critical thinking and the practical application of theoretical concepts in realistic scenarios.

In this context, gamification emerges as a promising pedagogical strategy with the potential to transform the educational experience in the legal field [8], [9], [10]. Gamification, defined as the use of game elements and mechanics in non-game contexts [11], has proven effective in various educational fields to increase student motivation, engagement, and academic performance [12].

However, its application in legal education, especially in the area of criminal law, has been little explored empirically.

The present study addresses this gap by examining the impact of implementing gamification strategies in the teaching-learning of General Criminal Law in university students. Specifically, it investigates how the use of educational games, such as domino and thematic cards, can facilitate the understanding of complex legal concepts, improve information retention, and develop critical thinking skills essential for legal practice. The relevance of this research lies in its potential to provide empirical evidence on the effectiveness of innovative methods in legal education, thus responding to the growing demands for reform in law teaching [13], [14]. Furthermore, the study contributes to the body of knowledge on the application of gamification in higher education contexts, an area that requires further exploration and validation [15].

The central question guiding this research is: Is there a significant relationship between the application of the ludic method as a didactic strategy and improvement in the teaching-learning process of General Criminal Law in university students? This general question is broken down into the following specific questions: (1) How does the application of the ludic method influence the development of students' cognitive competencies in relation to General Criminal Law? (2) In what way does the implementation of gamification strategies affect the development of procedural skills in the study of criminal law? (3) What impact does the use of ludic methods have on students' attitudes and motivation towards learning criminal law?

The general objective of this study is to determine the relationship between the application of the ludic method as a didactic strategy and improvement in the teaching-learning process of General Criminal Law in university students. The specific objectives include: Evaluating the impact of applying the ludic method on the development of cognitive competencies, analyzing how the implementation of gamification strategies influences the development of procedural skills, and examining the effect of using ludic methods on students' attitudes and motivation towards learning criminal law.

The general hypothesis proposes that the application of the ludic method as a didactic strategy is positively related to a significant improvement in the teaching-learning process of General Criminal Law in university students. The specific hypotheses suggest that: (H1) The application of the ludic method significantly facilitates the development of cognitive competencies; (H2) The implementation of gamification strategies substantially improves the development of procedural skills; and (H3) The use of ludic methods has a positive impact on students' attitudes and motivation towards learning criminal law.

This research is framed within the growing field of educational innovation in law teaching, responding to the need to develop pedagogical methods that better prepare future legal professionals for the challenges of the 21st century [16], [17]. By exploring the effectiveness of gamification in the specific context of criminal law, this study seeks to contribute not only to the improvement of educational practices in the legal field but also to the broader debate on the transformation of higher education in the digital age [12]. The results of this study have the potential to inform the design of more effective and engaging educational programs in the field of criminal law, providing educators with innovative tools to enhance the learning experience of students and, ultimately, contribute to the training of legal professionals better prepared to face the challenges of a constantly evolving legal environment.

2. Literature Review

Gamification in higher education has gained considerable attention in the last decade as an innovative strategy to improve student engagement and learning. A systematic review by [15] analyzed 41 studies on gamification in higher education, revealing positive results in terms of motivation, engagement, and academic performance. However, the authors noted the need for more rigorous empirical studies, especially in specific disciplines such as law.

In the context of legal education, [18] argue that gamification can be particularly beneficial due to the complex and often abstract nature of legal concepts. This idea is supported by studies by [19] and [20], who found that interactive and game-based approaches can significantly improve the understanding and retention of complex legal principles.

Specifically in the field of criminal aw, [21] revealed that, although gamification strategies are promising, their application is still limited due to the entrenchment of traditional methods in university teaching. However, [22] suggest that gamification represents a significant opportunity for pedagogical innovation in legal fields whose practice is developed through hearings, as is the case with criminal law.

[23] explored the use of Kahoot in teaching tort law and evidence law, demonstrating its potential to close learning gaps. Although not specifically focused on criminal law, the techniques used could easily be adapted to this field. Similarly, [24] presented a case study on a business organizations law course using various gamification techniques, which could be valuable in teaching procedural aspects of criminal law or simulating criminal justice cases.

[25] and [26] explored the development of game-based applications and the gamification of problem questions in law, respectively. These approaches could be especially useful in criminal law education, allowing students to experiment with different crime and punishment scenarios in a controlled environment, or simulate criminal investigations and trials.

Regarding the specific effects of gamification, [12] conducted a comprehensive review of 819 empirical studies, indicating positive effects on motivation, engagement, and learning enjoyment. However, they also noted that these effects may vary depending on the context and student characteristics.

[8] conducted a systematic review on virtual gamification strategies in legal education, while [27] proposed a workshop combining service-learning and collaborative gaming. Although not specifically focused on criminal law, their findings and proposals could be adapted to this field.

[28] presented a gamification experience in a law course in Brazil, highlighting success in maturing behavioral, relational, technological, communicational, and ethical skills, suggesting that similar approaches could be valuable in training future criminal law professionals.

Finally, [13] examined the factors that contribute to the development of law professors as educators, revealing that the adoption of innovative teaching methods, including gamification strategies, can significantly improve teaching effectiveness and student satisfaction.

Collectively, these studies suggest that gamification has significant potential to transform legal education, including areas such as criminal law and criminal justice. Although specific research in these areas is limited, the principles and methods described could be adapted to create more engaging, interactive, and effective learning experiences in criminal law teaching. However, more empirical research is needed to fully understand its impact and best practices for implementation in this specific context.

3. Methodology

This section details the research approach and methods employed to evaluate the effectiveness of gamification in teaching General Criminal Law. The methodology was designed to ensure rigorous data collection and analysis while maintaining ecological validity in an educational setting.

3.1. Research Design

A quasi-experimental single-group design with pre-test and post-test measures was implemented.

This design was selected for its suitability in evaluating the impact of educational interventions in natural classroom contexts, where random assignment is not feasible [29].

3.2. Participants

The sample consisted of 47 students (N = 47) enrolled in the General Criminal Law course at Universidad Privada del Norte, Lima, Peru. Participants, aged between 19 and 24 years (M = 21.3, SD = 1.7), were selected through convenience sampling. All students provided informed consent to participate in the study.

3.3. Instruments

The study utilized three primary instruments to collect both quantitative and qualitative data on student learning and perceptions:

3.3.1. General Criminal Law Knowledge Questionnaire (GCLKQ)

An ad hoc 21-item multiple-choice instrument was developed to assess students' knowledge in five key dimensions of General Criminal Law: (a) Principles of Criminal Law, (b) Theory of Crime, (c) History of Criminal Law, (d) Application of Criminal Law, and (e) Criminal Responsibility. Each item presented four response options, with only one correct answer. Content validity was established through expert judgment (n = 5), and reliability was assessed using Cronbach's alpha coefficient ($\alpha = .83$).

3.3.2. Ludic Materials

Legal-Historical Domino: A set of 28 tiles covering the historical evolution of criminal law. Each tile contained a historical event or figure on one side and its description or impact on criminal law on the other.

Criminal Law Concept Cards: A deck of 52 cards divided into four categories: definitions, norms, jurisprudence, and practical cases. The cards were designed to foster concept association and practical application.

3.3.3. Ludic Method Perception Scale (LMPS)

A 7-item Likert scale was designed to assess students' perceptions of the ludic method. The items addressed aspects such as enjoyment, novelty, perceived usefulness, and difficulty. Each item was scored on a scale from 1 (Strongly disagree) to 5 (Strongly agree). The internal consistency of the scale was assessed using Cronbach's Alpha ($\alpha = .79$).

3.4. Procedure

The implementation of the study followed a structured timeline to ensure systematic data collection and intervention delivery:

The study was conducted over one academic semester (16 weeks). In the first week, the GCLKQ was administered as a pre-test. During the following 14 weeks, ludic methods were implemented as an integral part of the course. The Legal-Historical Domino was applied first, followed by the Criminal Law Concept Cards, taking into account the topic to be developed in the scheduled unit. These were used in weekly 90-minute sessions. In week 15, the GCLKQ was re-administered as a post-test, immediately followed by the LMPS.

3.5. Operationalization of Variables

To ensure precise measurement and analysis, the study variables were carefully defined both conceptually and operationally:

Independent variable: Application of the ludic method

- Conceptual definition: Didactic strategy that uses educational games to facilitate the learning of General Criminal Law.
- Operational definition: Implementation of two educational games (Legal-Historical Domino and Concept Cards) during 14 class sessions.

Dependent variable: Learning of General Criminal Law

- Conceptual definition: Acquisition and understanding of fundamental concepts of General Criminal Law.
- Operational definition: Score obtained in the GCLKQ, with a possible range of 0 to 21 points.

Intervening variable: Perception of the ludic method

- Conceptual definition: Students' subjective assessment of the effectiveness and attractiveness of the ludic method.
- Operational definition: Mean score obtained in the LMPS, with a range of 1 to 5.

3.6. Data Analysis

Statistical analyses were conducted to evaluate the effectiveness of the intervention and explore relationships between variables.

Data were analyzed using IBM SPSS Statistics v27. Descriptive analyses were performed to characterize the sample and summarize the GCLKQ and LMPS scores. To assess the change in knowledge, a paired-samples t-test was employed, comparing the pre-test and post-test scores of the GCLKQ.

Effect size was calculated using Cohen's d. Additionally, Pearson correlation analyses were conducted to explore the relationships between improvement in the GCLKQ and perceptions measured by the LMPS.

This rigorous methodology allows for a comprehensive evaluation of the impact of the ludic method on the learning of General Criminal Law, providing both objective measures of improvement in knowledge and insights into students' perceptions of this innovative pedagogical approach.

4. Results

Preliminary analysis of the data revealed normal distribution of GCLKQ scores for both pre-test (W = 0.976, p = .452) and post-test (W = 0.981, p = .623) as assessed by the Shapiro-Wilk test. No significant outliers were detected ($|z| > 3.29$), ensuring the robustness of subsequent analyses.

Table 1 presents a comprehensive overview of the descriptive statistics for the GCLKQ scores. Notably, the mean score increased substantially from pre-test (M = 10.23, SD = 2.68) to post-test (M = 13.81, SD = 2.95), indicating a marked improvement in students' knowledge of General Criminal Law.

Table 1. Descriptive statistics of the GCLKQ (N = 47)

Measure	M (SD)	CI 95%	Mín	Máx	Skewness	Kurtosis
Pre-test	10.23 (2.68)	[9.45, 11.01]	5	16	0.14	-0.52
Post-test	13.81 (2.95)	[12.95, 14.67]	7	20	-0.09	-0.38

Note: M = mean; SD = standard deviation; CI = confidence interval; Min = minimum; Max = maximum.

A paired-samples t-test was conducted to quantify this improvement, revealing a statistically significant increase in GCLKQ scores from pre-test to post-test, t(46) = 11.54, p < .001. The magnitude of this effect was substantial, as evidenced by a large Cohen's d of 1.68 (95% CI [1.26, 2.10]). This robust effect size underscores the considerable impact of the ludic methods on students' understanding of General Criminal Law concepts.

Further analysis of individual GCLKQ dimensions, as detailed in Table 2, revealed significant improvements across all areas. Particularly noteworthy was the advancement in the "Principles of Law" dimension, which exhibited the largest effect size (d = 1.22). Conversely, while still significant, the "Criminal Responsibility" dimension showed the smallest improvement (d = 0.73). These findings suggest that while the ludic methods were broadly effective, their impact varied across different aspects of criminal law knowledge.

Table 2. Changes by GCLKQ dimension (N = 47)

Dimension	Pre-test M (SD)	Post-test M (SD)	Diferencia M (SD)	t	p	d
Principles of Law	2.15 (0.93)	3.06 (0.87)	0.91 (0.75)	8.34	<.001	1.22
Theory of Crime	2.23 (1.05)	3.09 (0.95)	0.85 (0.81)	7.23	<.001	1.05
History of Criminal Law	1.89 (0.84)	2.55 (0.93)	0.66 (0.70)	6.48	<.001	0.95
Application of Criminal Law	2.06 (0.87)	2.74 (0.85)	0.68 (0.66)	7.11	<.001	1.04
Criminal Responsibility	1.91 (0.86)	2.36 (0.79)	0.45 (0.62)	5.01	<.001	0.73

Note: M = mean; SD = standard deviation; t = t-statistic; p = p-value; d = Cohen's d.

The Ludic Method Perception Scale (LMPS) results, summarized in Table 3, provided valuable insights into students' attitudes towards the implemented educational games. Notably, items related to learning assistance and novelty received exceptionally high scores (M = 4.57, SD = 0.58 and M = 4.53, SD = 0.62 respectively), with over 90% of students agreeing or strongly agreeing with these aspects.

The relatively low score for perceived difficulty (M = 3.43, SD = 1.06) further indicates that students found the ludic methods accessible and engaging.

Table 3. Results of the Ludic Method Perception Scale (N = 47)

Item	M (SD)	95% CI	% Agree/ Strongly agree
1. Enjoyment	4.23 (0.79)	[4.00, 4.46]	87.2%
2. Novelty	4.53 (0.62)	[4.35, 4.71]	93.6%
3. Help in learning	4.57 (0.58)	[4.40, 4.74]	95.7%
4. Topic reminder	4.15 (0.81)	[3.91, 4.39]	85.1%
5. Perceived difficulty (reversed)	3.43 (1.06)	[3.12, 3.74]	19.1%
6. Recommendation to others	4.19 (0.80)	[3.96, 4.42]	83.0%
7. Enjoyable for family play	4.23 (0.79)	[4.00, 4.46]	85.1%

Note: M = mean; SD = standard deviation; CI = confidence interval.

To explore the relationship between knowledge improvement and student perceptions, Pearson correlation analyses were conducted. As shown in Table 4, significant positive correlations emerged between GCLKQ improvement and several LMPS items. The strongest correlation was observed with perceived help in learning (r = .45, p = .002), followed closely by the topic reminder aspect (r = .41, p = .004). Interestingly, perceived difficulty showed a significant negative correlation with improvement (r = -.32, p = .028), suggesting that students who found the methods less challenging tended to show greater knowledge gains.

Table 4. Correlations between GCLKQ improvement and ludic method perceptions (N = 47)

LMPS Item	r	p
1. Enjoyment	.38	.008
2. Novelty	.29	.048
3. Help in learning	.45	.002
4. Topic reminder	.41	.004
5. Perceived difficulty (reversed)	-.32	.028
6. Recommendation to others	.36	.013
7. Enjoyable for family play	.22	.137

Note: r = Pearson correlation coefficient; p = p-value

These results collectively demonstrate not only a substantial improvement in students' General Criminal Law knowledge following the implementation of ludic methods but also highlight the positive reception and perceived efficacy of these innovative teaching strategies. The consistent improvement across all knowledge dimensions, coupled with favorable student perceptions, strongly supports the potential of gamification in enhancing both learning outcomes and student engagement in legal education.

5. Discussion

The results of this study provide solid empirical evidence on the positive impact of implementing ludic methods in the teaching-learning of General Criminal Law among university students. The significant improvement observed in the scores of the General Criminal Law Knowledge Questionnaire (GCLKQ) between the pre-test and post-test, with a large effect size (d = 1.68), supports the general hypothesis that the application of the ludic method as a didactic strategy is positively related to an improvement in the teaching-learning process of General Criminal Law.

This substantial improvement in academic performance aligns with previous findings on the effectiveness of gamification in higher education [12], [15]. In particular, the results corroborate the observations of [19] and [20] on the potential of interactive and game-based approaches to improve the understanding and retention of complex legal principles. The improvement observed across all dimensions of the GCLKQ, especially in "Principles of Law" and "Theory of Crime", suggests that ludic methods can be particularly effective in addressing the more abstract and conceptual aspects of criminal law, a challenge highlighted by. [18] in the context of legal education.

The analysis by GCLKQ dimensions reveals that, while all areas experienced significant improvements, some benefited more than others from the ludic approach. The "Principles of Law" dimension showed the greatest increase, which could be attributed to the fundamental nature of these concepts and their cross-cutting applicability in the Legal-Historical Domino game and Concept Cards. This finding is particularly relevant considering the importance of fundamental principles in the training of future legal professionals, as noted by [7] and [6].

The improvement observed in the "History of Criminal Law" dimension suggests that the Legal-Historical Domino was effective in facilitating the understanding and retention of key historical events and figures.

This aligns with [21] observations on the potential of gamification strategies to innovate in the teaching of aspects traditionally addressed through expository methods.

The highly positive perceptions of students about the ludic method, evidenced by the results of the Ludic Method Perception Scale (LMPS), support the third specific hypothesis about the positive impact on attitudes and motivation. The high appreciation of novelty and perceived help in learning coincides with the findings of [12] on the positive effects of gamification on motivation and learning enjoyment. Furthermore, the low perceived difficulty suggests that ludic methods can make complex legal concepts more accessible, thus addressing one of the main challenges in teaching criminal law as pointed out by [3] and [4].

The significant positive correlations between improvement in the GCLKQ and various aspects of ludic method perception, particularly with perceived help in learning (r = .45, p = .002), provide additional evidence of the effectiveness of this pedagogical approach. These results align with the observations of [23] and [24] on the potential of gamification techniques to close learning gaps and improve understanding of complex legal concepts.

The successful implementation of educational games (Legal-Historical Domino and Concept Cards) demonstrates the feasibility of adapting gamification principles to the specific context of criminal law, thus addressing the gap identified by [21] on the limited application of these strategies in traditional university law teaching. The findings support the suggestions of [22] on the potential of gamification to innovate in the pedagogy of legal fields that involve audience-based practices, as is the case with criminal law.

The improvement in procedural skills, inferred from the increase in scores on the "Application of Criminal Law" and "Criminal Responsibility" dimensions of the GCLKQ, suggests that ludic methods can be effective in developing essential practical competencies in the training of future legal professionals. This aligns with the observations of [28] on the potential of gamification to mature behavioral, relational, and ethical skills in legal education.

It is important to note that, although all dimensions showed significant improvements, "Criminal Responsibility" presented the smallest increase. This could indicate that some more complex or specific aspects of criminal law might require additional approaches or a more refined adaptation of ludic methods, a consideration that future studies should address.

The high recommendation rate and positive perception of the potential for games to be used in a family context suggest that these ludic methods could have applications beyond the classroom, fostering continuous learning and discussion of legal topics in informal settings.

This aligns with the observations of [13] on the importance of innovative teaching methods to improve teaching effectiveness and student satisfaction.

Thus, this study provides robust empirical evidence on the effectiveness of ludic methods in teaching General Criminal Law, thus contributing to the growing body of knowledge on gamification in legal education. The results suggest that the implementation of gamification strategies can significantly improve both academic performance and student motivation, thus addressing several of the challenges identified in the literature on law teaching in the 21st century [16], [17].

However, it is important to acknowledge the limitations of this study, including the single-group quasi-experimental design and the relatively small sample size. Future studies should consider experimental designs with control groups, larger and more diverse samples, and long-term follow-up to assess knowledge retention and skill transfer to professional practice.

Despite these limitations, the findings of this study have significant implications for pedagogical practice in legal education, suggesting that the incorporation of ludic methods could be an effective strategy to improve the teaching of criminal law and, potentially, other areas of law. Future studies could explore the adaptation of these methods to other branches of law, as well as investigate the differential impact of various types of educational games on the learning of specific legal concepts.

6. Conclusion

This study provides empirical evidence on the effectiveness of ludic methods in teaching General Criminal Law at the university level. The results demonstrate a significant improvement in students' knowledge following the implementation of gamification strategies, with a large effect size ($d = 1.68$) in the General Criminal Law Knowledge Questionnaire (GCLKQ). This improvement was consistent across all dimensions evaluated, particularly standing out in the *Principles of Law* and *Theory of Crime*. The highly positive perceptions of students about the ludic method, as evidenced by the Ludic Method Perception Scale (LMPS), suggest that this pedagogical approach is not only effective in improving learning but also increases student motivation and engagement.

The positive correlation between performance improvement and favorable perceptions of the ludic method reinforces the idea that gamification can be a valuable tool to address the challenges of contemporary legal education. The implemented educational games (Legal-Historical Domino and Concept Cards) proved to be particularly effective in facilitating the understanding of complex and abstract concepts of criminal llaw, as well as in developing procedural skills essential for legal practice.

Future research directions should include longitudinal studies to assess long-term retention of acquired knowledge, transfer of skills to professional practice, and impact on overall academic performance. Additionally, it would be valuable to explore the adaptation of these ludic methods to other areas of law, investigate the differential effect of various types of games on learning specific legal concepts, and examine the effectiveness of gamification in combination with other innovative pedagogical strategies. Future studies could also benefit from experimental designs with control groups and larger, more diverse samples to increase the generalizability of the results.

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