Learning about political systems while playing: Testing short-term knowledge retention through a role-play classroom game

Aprender sobre sistemas políticos jugando: testando la retención de conocimientos a corto plazo mediante un juego de rol en el aula

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Abstract

Active-learning environments have been slowly but increasingly integrated into the political science curricula. Students and professors have fun in the active-learning processes. However, we still need evidence to support the nexus between learning and playing to ensure students learn more, or at least the same, with active-learning methodologies than with traditional ones. This article tests the effect of game-based learning on knowledge acquisition about political systems. We conduct a quasi-experiment in a Spanish university on second-year political science major students. Two groups were exposed to the treatment (role-play), and the third did not receive the intervention but a traditional lecture. We conducted a multi-method analysis to explore the data. Our results confirm that students exposed to role-plays have higher short-term knowledge retention about political systems than those who took the traditional lectures. The main sociodemographic factor pushing knowledge retention is the current GPA of students. Qualitative analysis shows that, through games, students perceive a reinforcement of their skills and recognize the usefulness of role-playing games in for teaching electoral formulas, the benefits of redistribution and trade, and the complexities around decision-making in political systems.

Keywords: active learning, innovation, simulation, gamification, experiment, factual and procedural knowledge.

Resumen

El aprendizaje activo se ha ido integrando en los planes de estudio de Ciencias Políticas. Estudiantes y profesores se divierten, pero necesitamos evidencia para sustentar el nexo entre aprendizaje y juego para asegurarnos de que los alumnos aprenden más, o al menos lo mismo, que con las metodologías tradicionales. En este trabajo se comprueba el efecto del aprendizaje basado en el juego en la adquisición de conocimientos sobre los sistemas políticos. Llevamos a cabo un cuasi experimento en una universidad española con estudiantes de segundo curso de la carrera de Ciencias Políticas. Dos grupos fueron expuestos al tratamiento (juego de rol), y el tercero a una clase tradicional. Realizamos un análisis multimétodo para explorar los datos. Los resultados confirman que los expuestos a los juegos de rol tienen una mayor retención de conocimiento a corto plazo sobre los sistemas políticos que aquellos que recibieron solo clases tradicionales. El principal factor sociodemográfico asociado con la retención de conocimientos es la nota media. El análisis cualitativo revela que los estudiantes perciben un refuerzo de sus competencias y reconocen la utilidad de los juegos de rol en la enseñanza de las fórmulas electorales, los beneficios de la redistribución y el comercio y la toma de decisiones en los sistemas políticos.

Palabras clave: aprendizaje activo, innovación, simulación, gamificación, experimento, conocimiento factual y procedimental.

INTRODUCTION

Active-learning environments aim to encourage students to participate in their learning and be more engaged in the classroom (Snyder, 2003). Universities are increasingly promoting active-learning methodologies and innovative teaching (Van Horne *et al.,* 2012). Student-centered teaching is slowly substituting traditional teacher-centered education (Duchatelet *et al.*, 2020), although the prioritization of active learning is still low in political sciences courses (Archer and Miller, 2011).

Many of us have implemented some active-learning activities. For example, it is now more common in political science to find courses with simulations, collaborative video projects, podcasts, social-media-based learning, or infographics. With the institutionalization of exercises or activities to complement lectures as part of the Bologna Process in Spain, every student is expected to have some active-learning experience in every course. Many might recognize that students and professors have fun in the active-learning process. Students might think they are learning with active methodologies, although recent research shows that perceived/subjective learning is higher than the real learning (see Ferreiro, 2020). Therefore, we still need experimental evidence to support the nexus between learning and playing (Baranowski and Weir, 2015). In

other words, we need experimental results to ensure students learn more or at least the same with active-learning methodologies than with traditional ones.

The literature shows, so far, that active learning methodologies in political science have a positive effect on study results (Raymond and Usherwood, 2013), students' engagement (Lazareva and Cruz-Martínez, 2020), affective learning (Jones and Bursens, 2015), and even in encouraging citizen participation (Oros, 2007). However, there is no consensus that active learning methodologies positively affect learning and student performance more than traditional lectures (Powner and Allendoerfer, 2008). If we want to know why and if active learning promotes knowledge acquisition or short-term retention of knowledge, we need to continue testing, preferably with experiments (Omelicheva and Avdeyeva, 2008).

Duchatelet *et al.* (2020) list a series of active learning methods, among which we can highlight: discussions and question techniques, problem-based learning, case-based learning, and game-based learning. The paper's main objective is to test the effect of game-based learning on short-term knowledge retention about political systems. Specifically, we examine the effect of a role-play about a political system versus a traditional lecture on political systems in knowledge acquisition. Is short-term knowledge retention about political systems better after a conventional lecture or an active-learning dynamic like a simulation? To answer this question, we hypothesize that groups using an active learning approach should have acquired more competencies, skills, and knowledge on the subject; thus, we expect them to perform better in the second test than the control group. Secondary objectives include (1) testing if short-term knowledge retention about political systems remains after controlling for individual sociodemographic factors; (2) examining affective and competence dimensions within the active-methodology learning process; and (3) exploring the use of role-playing to understand the decisional and feedback dimension of the political system.

We conduct a quasi-experiment in a Spanish public university on second-year political science major students. Two groups were exposed to the treatment (role-play), and the third did not receive the intervention but a traditional lecture on political systems. We conduct a multi-method analysis to analyze the data: T-tests, chi-square tests, regression analyses, and discourse analysis on the debriefing session after the role-play and open-ended questions in one of the questionnaires.

Our results confirm that students exposed to role-plays have better short-term retention knowledge about political systems than those who took the traditional lectures about political systems. Students learned, on average, 39.3% more thanks to the role-play in experimental group 1 and 24.3% more in experimental group 2. The final shared reflection on the discursive interactions between the participants shows that students become self-perceived as better trained in complex phenomena detailing and concepts articulation while strengthening self-confidence and group identity. We contribute to the literature with experimental results and qualitative analysis of the debriefing session showing the positive effects of active learning methodologies over traditional lectures.

This paper is organized as follows. The following section presents the conceptual framework of political systems (the object of study in our quasi-experiment), role-playing, and active learning. The third section introduces the research design: the learning objectives of the role-play, how we measure short-term knowledge retention, and the description of the role-play. Later, in section 4, we present the qualitative and quantitative analysis and the results. The article finalizes with a general conclusion.

CONCEPTUAL FRAMEWORK: POLITICAL SYSTEM AND ACTIVE LEARNING

The political system

The political system is the basic structure of analysis in political science and the conceptual framework to explain political phenomena in current societies. David Easton (1953) introduced the systemic approach and the "system" concept. The General Systems Theory from the natural sciences (Ludwig, 1950) gave Easton the foundations to explain the constant interaction between the power structures (polity), the government action (policy), and the daily game of political actors (politics) in every State. In his input-output model, the political system operates as a circular feedback process that receives demands from organized society and returns public policies. Such a process impacts the political system, legitimizing itself by generating stability.

Later, the policy-making model of Norton (1985) complemented Easton's analytical scheme by conceiving the political system as a linear decision-making process organized in phases in which primary and secondary actors participate using veto powers. Every political system operates in a social environment with which it interacts. Social values and attitudes also modulate the aggregating interests process and social conflict resolution. The seminal conceptualizations of Easton and Norton have been complemented by Almond's (1976) structural-functional systems theory and Luhmann's self-controlled systems (1984), which emphasize the search for social balance and self-survival as ultimate goals of the political system.

The main pedagogical objective of the "Comparative Politics" subject is understanding the political system as a process of feedback and decision-making that allows us to compare different countries and differentiate them from a regime perspective (Soto, 2020). Students will then understand the logic of systematic comparison between countries and, thus, describe societies, create typologies of political phenomena, formulate theories, and anticipate likely outcomes in other scenarios. For this purpose, simulations have tried to approach the complexity of political systems for students by using role-playing games. Most of these methodological experiences have been conceived to teach International Relations (Bridge and Radford, 2014; Brynen, 2015) and Public Law subjects (Sáez and Gamarra, 2012; Espaliú, 2017) to recreate the decision-making process within the global governance institutions. In the

area of Political Science, first simulations were carried out to recreate the United States political system (Endersby and Webber, 1995; Baranowski, 2006), although its use has become widespread to understand the functioning of political systems in other latitudes (Gorton and Havercroft, 2012; Ferreiro, 2020).

Role-playing and active learning

In 2005, the Bologna Working Group on Qualifications Frameworks warned of the need to set guidelines to attain the so-called Europe of Knowledge and identified, for the first time, the expected competencies: to know and to understand, to know how to act and how to be (Huber, 2008).

In this scenario of methodological opportunity, games provide the tool to capture the students' interest to encourage their motivation and develop critical thinking, problem-solving, and communication skills (Qian and Clark, 2016). Gamification is a learning technique that transfers the mechanics of games to foreign scenarios, such as the educational-professional field, to achieve learning objectives and better results (Deterding, 2013). A concept is transformed into an activity of competition, cooperation, exploration, and narration (Parente, 2016: 15). The proliferation of experiences and methodological guidelines developed as part of innovation and teaching quality projects (Inglada *et al.*, 2013; Bustos *et al.,* 2017) shows the rise of gamification in Spanish higher education. All of them are designed to optimize the motivation and academic results of the Z Generation —digital, multitasking, dynamic, self-taught, and experiential— which currently attends university classrooms.

Bloom's Taxonomy (1956) provides an analytical framework for assessing the impact of these new active methodological tools on teaching outcomes. Bloom conceived the learning process as hierarchical and cumulative, in which the mastery of lower-level mental abilities (knowing, understanding, and applying) allows the student to manage higher-level abilities (systematize, analyze and evaluate). Kratwohl's contribution (2002) to Bloom's pyramid of knowledge provides a conceptual scheme to operationalize the four dimensions of knowledge: *factual* (to know the basic elements of the discipline); *conceptual* (to relate these elements in a higher structure of functioning); *procedural* (to master the methods of inquiring and doing); and *metacognitive* (to reflect upon the learning process). All of them interact with the following cognitive levels and mental skills:

— *Remember:* students memorize relevant information in the long run.
— *Understand:* capture the profound meaning of the concepts.
— *Apply:* use procedures in specific situations.
— *Analyze:* examine a phenomenon by considering its parts separately and relating them to each other.
— *Evaluate:* make judgments based on criteria and standards.
— *Create:* relate the elements forming a coherent and original whole new one.

Among the many options to implement the constructivist theories of education, simulations are one of the methodologies of problem-based learning (PBS) in which the students acquire knowledge, skills, and attitudes through real-life situations, applying the same reasoning they will use in the future professional setting. In our quasi-experiment, the simulation is about solving redistribution problems created by commercial activity in a territory with two constituencies. Three elections were held, and elected authorities (students) had to make proactive policy decisions (collect taxes) that could alter the correlation of the system's political forces. The role-play allows students to learn about the complexity of the political world and that it can be modeled but with uncertain results because of the chaotic nature of human interaction (Obach, 2003). Through the classrooms' play dynamics, participants reflect on the actors' motivations and opportunities in the institutional scenario, and they learn to negotiate while reinforcing the group identity (Asal *et al.*, 2015).

The literature has measured the effectiveness of the simulations showing their positive impact on short-term knowledge retention and self-perception by improving the motivation of those with previous knowledge and some intellectual maturity (De Freitas, 2007). In Political Science, simulations are collaborative effort exercises that strengthen oratory skills, confidence on stage, and critical thinking while providing a more profound knowledge of the political process (Boyer and Smith, 2015). Role-playing games and simulations recreate ambiguous environments with a high level of personalization that forces students to reflect from different perspectives, using the rules of logic and assuming the risks of their actions (Kolb and Fry, 1975:54). Therefore, as we stated before, our central hypothesis is that the active-learning methodology of role-playing the political system will be more effective than a traditional lecture in promoting short-term retention knowledge about the complexity of the political system.

Regarding the design, any simulation should be organized around the following phases:

a) Definition of learning objectives
   Knowledge. In our quasi-experiment, participants are expected to understand the decisional and feedback functioning of the political system as the basic structure of analysis in the "Comparative Politics" subject. The pre-test (Kahoot 1) measures the initial knowledge, and the post-test (Kahoot 2) measures the knowledge gained.
   Skills. We use the Syllabus of the three participating groups as the generic and specific skills framework. Our simulation should improve oratory skills, theoretical knowledge and help students make informed judgments and provide solutions. The subjective post-test will assess changes in those desired skills.
   Attitudes. The affective and relational aspects of the learning process will be measured by the subjective post-test and the debriefing session to identify the students' negative (frustrations) and positive (motivations) emotions.
b) Simulation and role-playing
   Professors shall provide essential information to participate in the game about timing, dynamics, rules of behavior, and engagement. It is crucial not

to overelaborate the instructions, limit the actions beyond what is allowed in real life, and encourage students' initiative and creativity when they play the assigned roles.

c) Closing session (debriefing)
At the end of the simulation game, participants share their experiences to turn them into learning. Professors lead the debriefing session through a guide of open questions for students to reflect on the actors' strategies and restrictions of institutional design that affected the best policy implementation. This allows professors to observe behavior patterns and see if students were able to recognize differences between simulation and real life. The session ends with a summary of the main points (takeaways) and their connection with the "Comparative Politics" subject topics. Testimonies from the final session are collected and assessed on the subjective report of achievements (perceptions).

d) Evaluation
After the debriefing session, a post-test (Kahoot 2) is distributed to measure short-term knowledge retention. These results are compared with the pre-test. Finally, students evaluate the simulation.

RESEARCH DESIGN

Learning objectives of the role-play

Following Kratwohl's (2002) revision of Bloom's (1956) taxonomy of the dimensions of knowledge mentioned above, the role-play seeks to build a series of factual and procedural knowledge about political systems. Factual knowledge refers to basic elements, concepts, and terminology about political systems. Students acquired these through lectures in the control group, while in the experimental groups, these are expected to be learned in the role-playing and debriefing session. Procedural knowledge implies understanding how political systems work. This is put into practice in the role-play, where students are expected to discover the complexities of the workings and decision-making of a government and the electoral process in a democracy. Finally, the debriefing session of the role-play also seeks to develop metacognitive knowledge about political systems.

Table 1.
Cognitive levels examined in the pre-and post-tests

	Question	Dimension of knowledge	Intellectual skills in the cognitive process
1.	Which of the following forms of democracy best represents today's Western democracies?	Factual about democracies	Remember

	Question	Dimension of knowledge	Intellectual skills in the cognitive process
2.	Which branch of government has the function of enforcing the laws of a state?	Factual about branches of government	Analyze
3.	What is a political system?	Factual about the political system	Remember
4.	What is an input?	Factual about Easton's input-output model	Remember
5.	In Spain, which electoral formula is used for its elections to the Congress of Deputies?	Factual about elections	Remember
6.	It refers to the territory used to translate votes into seats in parliament.	Factual about elections	Remember
7.	The support or tolerance of the parliamentary majority is necessary to form a government in a presidential system?	Factual about presidential versus parliamentary systems	Understand
8.	Which of the following characteristics represents the parliamentary system?	Factual about presidential versus parliamentary systems	Understand
9.	In the role-play, the head of State was democratically elected?	Procedural about presidential versus parliamentary systems	Analyze
10.	What do you call the differences that mark fractures between groups in a human community?	Factual about the political system	Remember
11.	The role-play is a good example of a parliamentary system.	Procedural about presidential versus parliamentary systems	Analyse/Apply
12.	How are parliamentary seats distributed with the D'Hondt divisor formula?	Procedural about elections	Understand
13.	In real-life politics, who usually initiate legislation in most parliamentary systems?	Factual about branches of government	Remember
14.	This is where the parliamentary system's main debate, negotiation, and laws are agreed upon.	Factual about branches of government	Remember
15.	What is an output?	Factual about Easton's input-output model	Remember
16.	What is the main advantage of the systemic approach for Comparative Politics?	Factual about the use of the political system in Comparative Politics	Analyze

Source: Own elaboration.

How do we measure the active learning acquired?

To test the effect of the role-play on learning about political systems, we conducted a quasi-experiment with three groups of the "Comparative Politics" course in the Faculty of Political Science and Sociology at the Complutense University in Madrid. Comparative Politics is a mandatory course for every student. The course is 4,5 ECTS credits and is taught in Spanish. The course aims to deepen the knowledge of the most relevant objects of studies and methodologies of comparative politics. The political system is the subject's basic structure of analysis covered in the three groups included in this experiment. Each group is taught by one of the co-authors. Two groups were exposed to the intervention (role-play), and the third did not receive the intervention but a traditional lecture on political systems. The assignment to a control or experimental group among the three groups of Comparative Politics was randomized. Students were not randomly assigned to a control or experimental group because students chose to take classes with one of the authors considering various reasons not examined here. This is why we consider this a quasi-experiment rather than a fully-fledged experiment. Both the lecture and the role-play lasted one session of 90 minutes.

Table 2.
Descriptive statistics

	Experimental Group 1	**Experimental Group 2**	**Control Group**
Degree	Sociology and International Relations (3rd Year students)	Political Science (2nd Year students)	Political Science (2nd Year students)
Number of students	47	54	33
Date of Pre-test	Second week	Second week	Second week
Date of Quasi-Experiment	Third week	Third week	Third week
Date of Post-test	Fourth week	Fourth week	Fourth week
Number of students participating in the role-play/lecture	43	51	19
Pre-test response rate	89.3%	N/A (data lost)	42.4%
Post-test response rate	80.8%	74.1%	39,4%

Source: Own elaboration.

Students did not know if they were in the control or experimental group. Participating in the role-play was not mandatory to approve the course; however, it was part of the evaluation. Every student was informed that the data collected would be used anonymously to improve the course and research purposes. A series of tests are given before and after the role-play/lecture playing Kahoot. Kahoot is a fun, fast and competitive way

of testing knowledge. Students complete the first pre-test about political systems knowledge in the second week of the course. Unfortunately, we lost the pre-test data in experimental group 2 due to technical errors in Kahoot. In the third week, the control group received a lecture on political systems, and the experimental group did the role-play. In the fourth week, the experimental group had a 30-minute debriefing session where students reflected on the role-play and the knowledge acquired about political systems. We also analyzed the answers to a script of open-ended questions related to the activity and the skills acquired. Students in the experimental and control group took the post-test in the fourth week of the course. One week after the role-play, the post-test of competencies, attitudes, and sociodemographic questions was distributed.

We used multi-method analysis in this paper. First, we used chi-square and T-tests to confirm the effect of the treatment on short-term knowledge retention and to test the knowledge acquired between and after the role-play in the experimental groups and the lecture in the control groups. Second, we used descriptive statistics to show an observational analysis of the knowledge about political systems. Third, ordinary least-square (OLS) regression analysis tests the potential explanatory factor of sociodemographic variables.

Fourth, and regarding qualitative techniques, we conducted two debriefing sessions (Group 1 and 2) to engage participants in an informal group discussion focused on five topics: process identification, interactions, plausibility of the game, and systematization of learned lessons. Through discourse analysis, we examined students' speeches to ascertain how students related to the accountability concept and how they lived this experience. The open-ended question forms completed by all the students complemented our analysis of perceived motivations and emotions.

Description of the simulation exercise

We modeled a miniature representation of a social quasi-experiment, which also helps to provide a deeper insight into methodological issues. To make the simulation work, professors stage the social, economic, and political system in accordance with some prerequisites. The social system was composed of individuals (the students), all of which had equal rights but had an underpinning cleavage: the physical division of the classroom into two halves. This cleavage was an arbitrary decision based on the infrastructure of the classroom, which divides the seats into two sections. There is no evidence that this is a factual division among students[1]. Two constituencies were created based on this division (east and west).

For the economic system, we gave students cards that represented four different types of commodities: food, education, housing, and health. Each card has a value and

1. Our intention with this division was not to create a division but to check if the students would adapt to that situation.

provides a certain number of points depending on how they are stockpiled. The game's objective was to accumulate the maximum possible points to win. Students were allowed to trade their cards with other students. They were told they could trade them in the order they wanted, but cards could not be given for free. Cards have either a logarithmical or an exponential logic of accumulating points. The following picture shows the cards to see the mentioned effect.

Figure 1.
Playing cards in the game

Source: Cards originally designed by Horacio Diez.

Playing cards were distributed in the following way. Each participant was given cards of a single type or combination, which aimed to incentivize the initial exchange (e.g., if I have two health cards, I will rationally look to exchange one of them for housing or a food type to increase my total number of points). A particular type of card was given to students on one side of the classroom, whereas other types were given on the other side. Therefore, the seating cleavage also corresponded to the kind of commodities students had. We also created wealth by giving some students an extra number of cards of the same goods, whereas others had just one card or none. We wanted to work on the question of exclusion, and that topic arises when some participants are not given any cards. We explained that not everyone starts with access to the same goods and services in the real world.

Once the economic and social systems were settled, we also set the conditions to develop the political system. We defined a Parliamentary system with an election of 5 representatives. Through a proportional system, representatives were elected in two constituencies, one bigger than the other (but the lesser one being overrepresented). The smaller circumscription elected two representatives, while the larger one elected three. One week before the simulation, the professors asked for three volunteers to become leaders of three political parties. They had to name their party and elaborate a political program/manifesto including four policy areas (i.e., food, education, housing, and health). After presenting their electoral programs to their classmates, political parties competed in an election.

Votes were cast for each party, and seats were assigned. This was an occasion to teach how the d'Hont formula works in practice with a real voting example. Afterward, a five-member legislature was established, and it lasted strictly 30 minutes. In those 30 minutes, students had the chance to trade, whereas political representatives agreed on a government, approved and collected taxes, and developed their redistributive policies. Once the 30 minutes were over, new elections were held (with the possibility of new parties arising), and we ran the second legislature for 30 minutes. Finally, the exercise ended with a final vote for a third legislature.

OUTCOMES

Analysis of learning outcomes

We conducted two chi-square tests to check if students of the experimental group outperformed those of the control group. The pre-test was performed in all groups to measure students' prior knowledge. We expect to find no statistically significant differences because all students have the same degree, and most are in the same year.

Overall, we can state that both control and experimental groups operated similarly. We find no statistically significant differences between groups on most questions, except for questions 3 and 7. Therefore, we can argue there are no critical differences in terms of previous knowledge about political systems between the control and experimental groups.

Table 3.
Students' results compared by the experimental and control group

		Groups		Total	Statistically significant differences
		Control	Experimental		
Question 1	Incorrect	7,1 %	7,1 %	7,1 %	No
	Correct	92,9 %	92,9 %	92,9 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 2	Incorrect	50,0 %	61,9 %	58,9 %	No
	Correct	50,0 %	38,1 %	41,1 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 3	Incorrect	50,0 %	90,5 %	81,5 %	Yes
	Correct	50,0 %	9,5 %	18,5 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 4	Incorrect	42,9 %	61,9 %	57,1 %	No
	Correct	57,1 %	38,1 %	42,9 %	
	Total	100,0 %	100,0 %	100,0 %	

		Groups		Total	Statistically significant differences
		Control	Experimental		
Question 5	Incorrect	71,4 %	64,3 %	66,1 %	No
	Correct	28,6 %	35,7 %	33,9 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 6	Incorrect	7,1 %	2,4 %	3,6 %	No
	Correct	92,9 %	97,6 %	96,4 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 7	Incorrect	64,3 %	31,0 %	39,3 %	Yes
	Correct	35,7 %	69,0 %	60,7 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 8	Incorrect	7,1 %	26,2 %	21,4 %	No
	Correct	92,9 %	73,8 %	78,6 %	
	Total	100,0 %	100,0 %	100,0 %	

Source: Own elaboration.

To test if the application of active learning techniques had an impact, we can compare the results of both groups after the simulation of the political system. We excluded questions 9 and 11 as they were related to issues only covered in the simulation. We find significant differences in half of the questions (10, 12, and 15). Every time there are significant differences, the experimental group outperforms the control group considerably (i.e., 20 points in Q10, 43 points in Q12, and 37 points in Q15). However, in the other half of the questions, there are no statistically significant differences, although the experimental groups outperform the control in two out of those three.

Table 4.

Students' results compared by the experimental and control group

		Groups		Total	Statistically significant differences
		Control	Experimental		
Question 10	Incorrect	30,8 %	10,7 %	13,6 %	Yes[2]
	Correct	69,2 %	89,3 %	86,4 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 12	Incorrect	92,3 %	49,3 %	55,7 %	Yes
	Correct	7,7 %	50,7 %	44,3 %	
	Total	100,0 %	100,0 %	100,0 %	

2. Statistically significant at the 0.07 level.

		Groups		Total	Statistically significant differences
		Control	Experimental		
Question 13	Incorrect	46,2 %	52,0 %	51,1 %	No
	Correct	53,8 %	48,0 %	48,9 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 14	Incorrect	92,3 %	82,7 %	84,1 %	No
	Correct	7,7 %	17,3 %	15,9 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 15	Incorrect	92,3 %	56,0 %	61,4 %	Yes
	Correct	7,7 %	44,0 %	38,6 %	
	Total	100,0 %	100,0 %	100,0 %	
Question 16	Incorrect	53,8 %	46,7 %	47,7 %	No
	Correct	46,2 %	53,3 %	52,3 %	
	Total	100,0 %	100,0 %	100,0 %	

Source: Own elaboration.

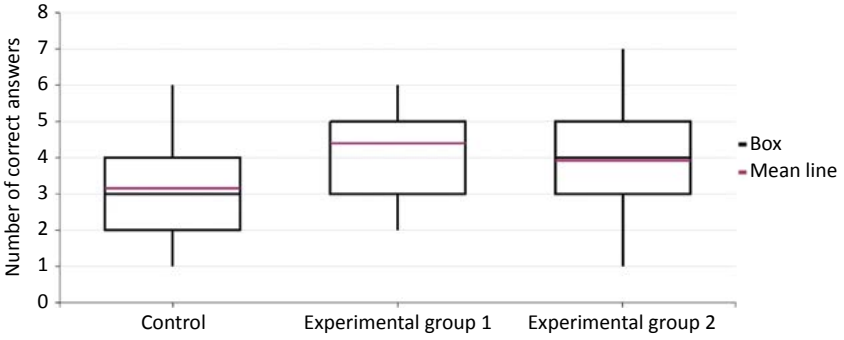
If we look closely at the questions where the experimental group outperformed the control group, those were explicitly related to the political system (Q10 deals with the notion of cleavages, Q12 with the electoral system, and Q15 with the concept of output). The other three questions served as control questions as the content asked was not related to the simulation itself. We observe a positive impact of this kind of active methodology on students' performance, although we need to confirm the overall effect, which we do in the next section.

Learning while playing? Testing the effect of role-plays on short-term knowledge retention

To test the effect of the role-play (treatment) on the student's knowledge of political systems, we conducted unpaired T-tests between the experimental and control groups. We found a positive effect of role-plays over traditional lectures on short-term knowledge retention in the first experimental group ($t(49) = 3.008$, $p = 0.004$) but not in the second ($t(48) = 1.498$, $p = 0.141$). Students learned, on average, 39.3% more thanks to the role-play in experimental group 1 and 24.3% more in experimental group two. However, it is impossible to confirm the statistical significance of the experimental group's two effects (the mean difference is 1.241 and 0.765, respectively)[3]. On average, students had 3.2 correct answers out of eight in the control group (SD = 1.463), 4.4 correct answers in experimental group 1 (SD = 1.220), and 3.9 correct answers in experimental group 2 (SD = 1.622).

3. We are measuring here learning with the average number of correct answers in the control and experimental groups.

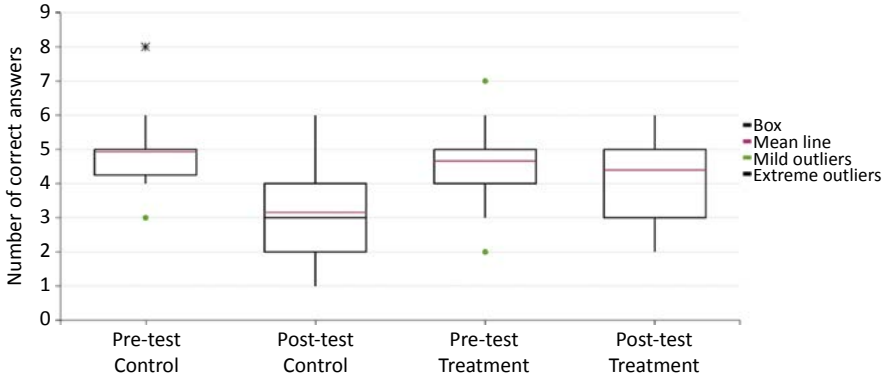
Figure 2.
Effect of role-playing on knowledge about political systems



Source: Own elaboration.

We also consider it relevant to test if students gained significant knowledge because of the experimental group's role-play and the lecture on political systems in the control group. We conducted a T-test between each group's pre-test and post-test results to measure this effect[4]. There is a significant difference between the factual knowledge of political systems before and after the lecture (t (25) = 3.529, p = 0.002). Surprisingly, students reduced the number of correct answers between the pre-and post-test. On average, students got five correct answers out of eight on the pre-test and 3.2 correct answers on the post-test. Surprisingly, there is no significant difference between the factual knowledge gained between and after the role-play.

Figure 3.
Effect of lecture and role-play on knowledge about political systems



Source: Own elaboration.

4. As mentioned, pre-test data of Group 2 was lost due to a Kahoot technical error as the software did not produce a spreadsheet with students' results. We are using here the data from Group 1.

Interestingly, the number of correct answers in the post-test was smaller in the control and the experimental group. One reason might be that the post-test had more complex questions than the pre-test, which will require further analysis. The mean difference between the pre-and post-test in the control group was 1.775 and in the experimental group was 0.476. This means that even though, on average, students had a larger share of incorrect answers in the post-tests of the control and experimental groups, the difference was statistically significantly smaller in the experimental group ($t(43) = 3.599$, $p = 0.0008$). So this is another hint at the positive effect of role-playing over traditional lectures on knowledge acquisition: students in the control group might be more prone to answering the post-test randomly (thus a higher variance of results) than those in the experimental group.

Testing the determinants of knowledge about political systems with OLS regressions: treatment and sociodemographic factors

The previous section provides evidence of the positive effect of active learning on short-term knowledge retention. It would be relevant to examine whether short-term knowledge retention about political systems remains or not after controlling for individual sociodemographic factors. Kyoshaba (2009) shows that parents' socioeconomic status matters in understanding students' academic performance. The rationale behind this is that parents with higher socioeconomic status are more capable of providing an environment that encourages the development of skills that facilitate success in school and higher education. Aidoo-Buameh and Ayagre (2013) and Zeegers (2007) confirm the relevance of university entry grades and prior academic performance on the current academic performance of undergraduate students in higher education. Kapinga and Amani (2016) ratify the relevance of university entrance exam points and highlight the importance of the student's choice of a degree program. Gibson (2008) concluded that students' socioeconomic status plays a role in their engagement behavior, which might also translate to learning. Parents' highest studies help us determine students' attitudes towards completing their studies (Czakó, 2017), implying more engaged students with higher probabilities of better academic performance. The families' cultural capital matters in understanding the academic achievement of students. The number of books at home is a proxy of cultural capital and is one of the family background determinants influencing students learning (Wang, 2004).

Considering the scholarship, we incorporated the following five sociodemographic factors in our model: University entrance exam score (PAU in Spain; score from 0-14), grade point average in the current bachelor (GPA; score from 0-10), highest studies achieved by any of their parents (5-point Likert scale)[5], binary variable to assess if the

5. No education is coded as 0, primary education as 1, secondary education (ESO, EGB, school graduate) as 2, post-compulsory secondary education (bachillerato, BUP, FP) as 3, and University studies (bachelor, master or doctorate) as 4.

current degree was their first option and the number of books at home (5-point Likert scale)[6]. We also incorporated a binary variable to re-test if participating in the role-play remains relevant. To confirm the potential effects of the role-play and these sociodemographic factors, we conducted a multivariate OLS between student's knowledge after the simulation (the number of correct responses in the post-test), a binary variable to test if students were part of the experimental group and the five sociodemographic control variables. The formula of the OLS model is: $Y_s = \beta X1_s + \alpha X2_s + \delta X3_s + \varepsilon X4_s + \zeta X5_s + \eta X6_s + A$; where *Y* refers to the scores in the post-test for every student (s), *X1* refers to university entrance exam score, *X2* GPA, *X3* highest studies achieved by any of the student's parents, *X4* the number of books at home, X5 is a dummy variable to test if the current degree was the first choice for the student, X6 is a dummy variable to test if the student participating in the role-play, *A* is the intercept, while β, α, δ, ε, ζ, η represent the regression coefficients.

Table 5 shows that a student's GPA is the only sociodemographic factor with a statistically significant relationship with learning about political systems. For every one-unit increase in GPA (i.e., a student with a seven versus an eight), we expect a 0.3 increase in the post-test score after holding the remaining factors constant to their respective means. However, the effect of participating in the role-play did not appear to be relevant after controlling for sociodemographic factors. Professors should consider this because the learning process can be increased with active-learning strategies, but underlying factors also matter.

Table 5.
OLS between scores in post-tests about political systems, participating in the role-play, and five sociodemographic factors

Explanatory factors	**Beta Coeff.**	**p-value**	**SD**	**LCL**	**UCL**
University entrance exam score	0.057	0.606	0.109	-0.163	0.276
Grade point average	0.282	0.035	0.130	0.020	0.543
Highest studies achieved by any of the parents	0.104	0.607	0.202	-0.300	0.509
Number of books at home	0.222	0.274	0.201	-0.181	0.625
The current degree was the student's first choice	-0.400	0.425	0.498	-1.397	0.598
Participated in the role-play	0.583	0.320	0.582	-0.582	1.749
Intercept	0.068	0.952	1.114	-2.165	2.301
R	0.480				
R2	0.230				
Adjusted R2	0.146				
F-statistic	2.742	0.021			
N	62				

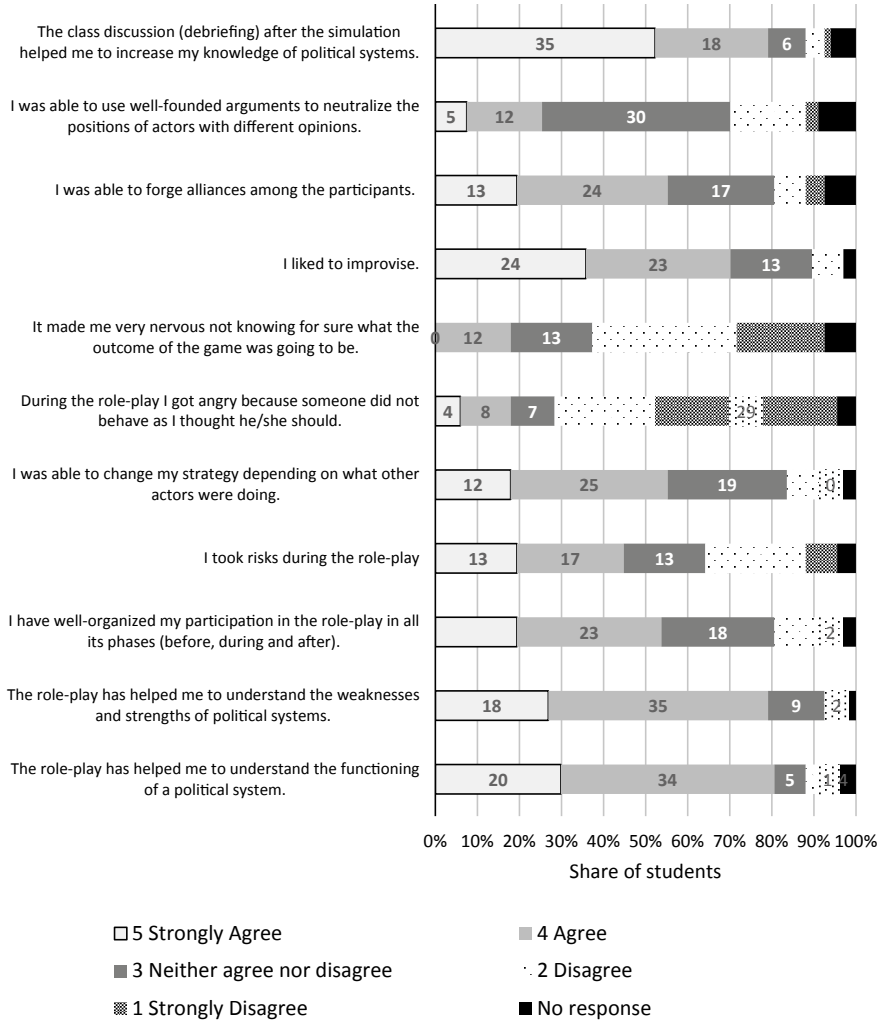
Source: Own elaboration.

6. Zero books is coded as 0, 1-25 books as 1, 26-100 as 2, 101-200 as 3, and more than 200 books as 4.

Attitudinal and competencies result in the role-play evaluation

Figure 4 presents the affective and competence dimensions within the learning process. Each of the eleven questions refers to a personal interaction or competence related to the active learning process. The figure shows the percentage of students participating in the role-play who strongly agree (5), agree (4), neither agree nor disagree (3), disagree (2), and strongly disagree (1) with each attitudinal statement. The figure also shows the number of students who responded to each statement.

Figure 4.
Responses to the attitudinal and competence test on the Likert scale

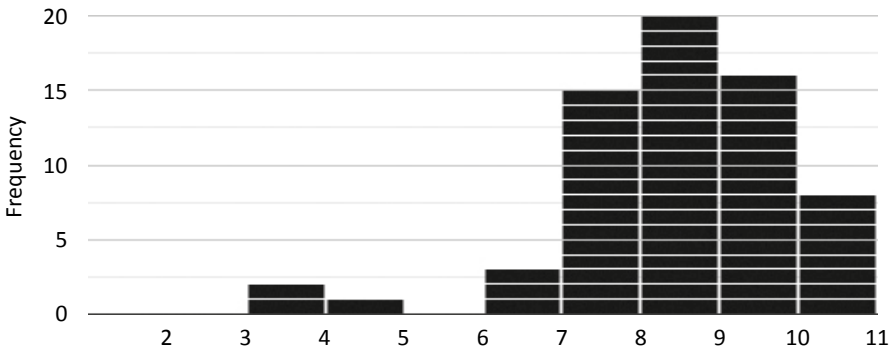


Source: Own elaboration based on Kolb and Fry (1975) and Ferreiro (2020).

81% of students strongly agree or agree that the role-play helped them understand the functioning of a political system. 79% strongly agree or agree that the role-play helped them understand the strengths and weaknesses of political systems. The same share of students has the same opinion about the usefulness of the debriefing to increase the knowledge of political systems. This last point confirms the utmost importance of having a debriefing session in any game or simulation to allow students to reflect and share their experiences on what has happened and transform them into knowledge (Ferreiro, 2020; Cruz-Martínez and Fonseca, 2020; Boyer and Smith, 2015).

Most students were able to forge alliances in the game (55%). However, as we explain in the qualitative section, having more explicit instructions on what could and should not be done might facilitate students' interactions in future role-plays. On the other hand, a larger share of students liked to improvise (70%). Most students (54%) considered their participation in the role-play was well-organized. In the previous week of the simulation, having briefly explained that students would need to come with three political parties, each with a list of five candidates for the role-play, might have contributed to this positive result. Finally, most students did not feel angry with the game's outcomes nor were nervous about the uncertainty of not knowing what the outcome would be (82% each). Figure 5 shows the generalized positive evaluation of the game. 68% of students gave grades of 8, 9, or 10 in the overall role-play assessment.

Figure 5.
Students' overall assessment of the role-play



Source: Own elaboration.

Qualitative analysis: debriefing and final evaluation

Professors led the discussion on the understanding of the game through five sets of open questions involving students in this metacognitive activity where they transform their experience into learning:

a) Processes, objectives, and resources identification
Was the best policy implemented? Participants analyzed the evolution of votes and seats during gameplay, pointing out that:

— Initial interexchange —tax collection, wages, purchase of goods and services— generated wealth and well-being, and the general well-being improved.
— The first redistribution reduced the original inequalities, and the coverage of goods and services was expanded: ¨I lost points with the first redistribution, but then I won again. In the end, we all had our needs covered, and none of us was rich¨.
— Favoritism in the allocation of public goods and unsupportive practices were committed. Professors inquired about the effect of electoral use of reasonable allocation and tax evasion on final redistribution: ¨I hid a playing card not to pay taxes or lose points¨. ¨We ran out of playing cards, and we thought about creating inequality intentionally so we could redistribute again. Even if that idea was against our values […] but we would have won¨. As such disclosures went by, participants pointed out the elections as the only mechanism to punish abuses of power since our simulation game did not include other actors who could activate horizontal accountability.
— Voters assessed the successes and failures of all redistributions. This affected the party system fragmentation, shifting from a bipartisan system to one with four political forces in the third election of experimental group 2: Unión Ciudadana, Ricos, Demos, and Cs.

Who were the winners and losers? Participants reflected on the reasons for the electoral success of winning parties:

— Information asymmetries: ¨If people had real-time information, all voters could have seen the positive evolution in the common well-being as a consequence of the exchanges we did¨.
— Altruistic behaviors: ¨I was the only one who kept voting for the Demos party even if I lost points. As the general well-being was guaranteed through the redistribution policies, I did not mind losing some cards¨. ¨I shared my playing cards with my partner because I had 6 of health, and she had none. It is better to have a playing card of every good than many of the same¨.
— Voter locations and issues representation: ¨It is a matter of preferences. For some people, a policy is understood as fiscal brutality, while for others is just redistribution¨.
— Party identity: In the case of the Unión Ciudadana party (experimental group 2), students stressed the importance of hard voter loyalty to maintain representation in the institutions.

— Erosion of the ruling coalition and social unrest: In all simulations, the ruling party lost votes after holding the government but remained in power. During the first exchanges, there was a mismatch in possession of goods, especially food, provoking hunger rows and demonstrations against the government, which people accused of being fascist. Professors invited students to consider whether this type of response had been given in contexts different from the UCM (other universities, countries). They reflected upon the salience of socialization spaces in activism and the strength of social capital in democracies.

— Electoral system: Demos party (experimental group 2) went from 3 to 4 seats, with no increase of votes, no voter movements or leaders' registration in other constituencies, and without gerrymandering. So, students visualized the particular way the d'Hondt formula distributes seats.

b) Interaction and communication

How did the lack of information impact your strategy in the role-play? We provided a few instructions on the players' roles to encourage proactive and self-directed participation. This lack of information had a limiting effect on the performance of some students, which was overcome in successive electoral rounds: "In the beginning, we had a minor role as a government because we did not know that we had all the government's functions, and we assumed that we could only collect taxes. However, the first round was to learn, and then we did better".

For other participants, however, it was not inconvenient for dynamism and the variety of their actions: "As we did not know what we could do or if there were strict rules, we understood that it was better to give people playing cards of education than playing cards of food because this way, you arrive faster and in better conditions to the labor market, and thanks to the labor insertion, you will solve the feeding issue. In future games, perhaps, it would be good to assign higher scores to education and thus earn points to obtain a master's degree, not only compulsory education".

Some students even proposed to kick-start the political system's feed flows. They asked whether they could address citizens (discourse of accountability) or establish direct communication mechanisms with the authorities (participatory and deliberative democracy instruments). The lack of information also stimulated the identification of the role played by professors in the game: "I identified that professors were the economic powers who influenced the direction of the political system from the shadows".

These testimonies show that non-directed learning environments stimulate element and dimension relationships in students with greater conceptual capacity (Hancok, 2002).

c) Plausibility of the game
To know the limits of the simulation, participants identified the extent to which the game experiences were far from the real world:

— Friendship bias of party interactions: Students acknowledged that friendship permeated the game atmosphere. This comradeship spirit avoided betrayals and strategic behaviors among government partners nor the emergence of party factions.
— District bias in voting: They noticed that the party system that emerges from the rules of the game revolves around the district as the only structuring cleavage. ¨We were all the same. There were no ideologies, and we could not sell ourselves as left-wing or green parties to get the vote. We could not develop an identification party program¨.
— Lack of companies and businesses: Government action was not affected by the pressure of interest groups or lobbies. Therefore, students could identify critical aspects of the political system as the input-output feedback process and its structural-functional dimension. Regarding the biases of friendship and district, they reflected on how these links restrict the daily play to conquer power and influence *(politics)* and channel the aggregation of interests. In terms of the economic powers, they warned that these collective actors condition the distribution of power *(polity)* in a society and the measures undertaken *(policies)* since they are part of the social environment that formulates demands and weaves support in the political system. To reduce these biases, professors proposed expanding the number of players in future editions of the game, including participants from other groups (to minimize the friendship bias) and diversifying structures and actors playing new roles.

d) Summary of the main points and their relationship with the study topics (takeaways)
Systematizing lessons enable students to compare their experiences with Political Science predictions:

— Commerce produces wealth, although it generates inequality: Our game contextualizes the study of the environment in the input-output model and the possible relations between economic development and democracy.
— Redistribution generates well-being: Participants noted the role of the State as a redistributive agent, approaching the study of policy outcomes and welfare model comparison.
— Electoral formula: Changes in the number of parties because of the elections allowed students to understand the electoral systems and compare their effects on democratic performance.
— Complexity around decision-making in a limited time: Experiences lived in the game, such as goods surplus, ruling under pressure, or doing nothing as

the best possible decision, brought students closer to analyzing the agent's decisions and public election theory.

e) Utility of the simulation
Finally, participants related their own experiences about what they learned:

— Short-term knowledge retention: Students agreed that kahoots facilitate information retention, especially from unsuccessful responses. Public exposure to failure in the heat of competition seems to stimulate individual learning: ¨I feel so much anger… to see that you miss that answer, and it affects your position. So, you remember that concept more. You know why you failed¨. This testimony confirms the impact of gamification on student memory and motivation (Ferreiro, 2020; Raymond and Usherwood, 2013; De Freitas, 2007), given the importance of the ludic way that digital natives give to the learning process and their appreciation for the dynamism and intensity of social interactions (Bautista, 2010). However, the effect on the concept's retention requires prior knowledge of the topics covered in the simulation. As the students reveal: ¨If you guess randomly, you do not hold anything back. It does not work if you have no idea about it¨. Therefore, and as Moizer *et al.* (2009) proved, to get the most out of simulations, it is essential to combine them with other teaching methodologies, including the most traditional ones (lectures).
— Complex phenomena detailing: Simulation facilitated the materialization and particularisation of the political processes under study. The plausibility of the game allowed participants to understand the sophistication of the political system dynamism: ¨In our classes, we do not see the complexity of what we study. We only see the definitions of the models of democracy, and that is very theoretical. You do not have time to see all the details. But when you are in the game, you realize. I could see it when I played the role of the police, what could and could not be done, the decisions that could be made, and the consequences¨. This testimony confirms the relevance of personal experience for the holistic understanding of sociopolitical processes. As Obach (2003) pointed out, the awareness of such complexity leads students to reflect on the motivations and opportunities that arise from the institutional scenario.
— Concepts articulation: Students' opinions showed an ability to relate concepts that seem static and see them in their procedural and dynamic dimensions. This process was especially evident in the students' analysis of the electoral formula. Students were able to analyze how regulation (institutional sphere), conditions of representation (actor's sphere), and ideology (values sphere) encourage changes in public policies (collective goods allocation sphere): ¨I understood the electoral system because of the distribution of seats in the two constituencies and the three elections held. Without a change in the number

of votes, the number of representatives changed, which affected us later in the exchange of the playing cards and the final redistribution¨. This analytical ability is a higher-order intellectual skill since it requires categorizing and structuring knowledge (Kratwohl, 2002). It is one of the expected competencies to be acquired through simulation games in our "Comparative Politics" subject (see section *Learning objectives of the role-play*).

— Collaborative interaction: The simulation was a collaborative effort that fostered peer learning. This was highlighted by the students when evaluating the performance of their peers: ¨Even if you prepare yourself just for your role, what you do adds to what others do. You must listen to and value their arguments. You learn from your peers. And you learn, above all, to negotiate¨. As evidenced by Asal *et al.* (2015), the game allows the insertion into political reality from a critical, reflective, and participatory perspective that fosters integration and group identity, as testimonies of the closing session confirmed: ¨We were all in it together as a government. And even though we knew we were going to fail with the deal and lose points, we were always together and loyal. I mean, if I lose, we lose together. You team up with classmates you have not spoken to in class or have not been assigned to do group work with¨.

— Self-confidence and self-assertion of abilities: Closing session testimonials reinforce the importance of personal interactions in active learning (Carr *et al.*, 2015) and the effect of confidence on self-esteem and decision-making ability (Boyer and Smith, 2015). The oratory required to negotiate the exchange of playing cards, or the role of activists and their demonstrations, increased student confidence to overcome stage fright and traditional reluctance to public speaking: ¨You see closely the real task of a representative, which is to sit, listen and make decisions. At first, that scares you, but then you say to yourself: I am capable. You have to overcome your fear¨.

— Normalizing the processes, institutions, and actors of the political system: Simulations recreate events and dramatize different situations between peers. This exercise brings national institutions closer to university students in a familiar scenario, normalizing the political processes, public agencies' tasks, and the primary skills of the political actors. ¨In the United Nations Model, I did not feel comfortable. It is just elitist posturing, and if you have no previous experience, you cannot participate. There is no interaction, it only seeks to make a show on stage by yourself, and in this simulation, we must work together. It is more accessible; we all participate¨. In the view of participants, replication of the national political system generated less reluctance than other educational tools used to emulate global governance. Thus, the slightest imposture, more spontaneity, and inclusiveness would favor the receptivity of the game and the feeling of internal political effectiveness of the students.

Lastly, to finish our quasi-experiment, participants completed an evaluation questionnaire that also included two open questions about the usefulness of kahoots and simulations in teaching "Comparative Politics" subject, which corroborate the testimonies of the debriefing session:

Regarding Kahoot as a teaching tool, 50% of respondents noted its positive effect on remembering concepts. Despite this, 9.5% conditioned such outcomes to the need of a lecture before and after simulation: "It seems to me that it is a handy method to establish knowledge once these have been addressed, in some way, in the previous sessions".

Dynamism and fun while participating (30.4%) and motivation (31.7%) were other teaching virtues of the kahoots:

> It is pretty good because they all participate, even people who often do not participate in class because of their shyness. It is an excellent initiative to include everyone in learning.
>
> I love it. It is so much fun. It increases interest and attention, making you want to attend class because you are interested in the subject.
>
> The important thing about Kahoot may not be the activity itself but having teachers predisposed to value such pedagogy and orient their work to make classes more understandable. And much of that is missing in this Faculty.

The anonymous questionnaire allowed negative opinions to emerge that were not revealed in the debriefing session. Thus, 19% of the participants rejected the use of this tool because it was considered not very reflective or showed discomfort:

> Kahoot stimulates thinking, although it is somewhat stressful. It generates a bit of anxiety; there is little time for each question.
>
> It is OK to learn punctual things, but I do not think Kahoot transmits truly reflective knowledge. It is useful, although I consider it counterproductive because of the little time to think.

These testimonies warn of the limitations of active-learning methodologies and their adverse effects on certain students, for whom competition and winners' podium exhibitions could be intimidating and discourage their learning process (Moizer *et al.,* 2009).

Regarding the evaluation of simulations as teaching tools in the "Comparative Politics" subject, all respondents underlined the game's effectiveness in learning aspects of the government functioning and elections in a playful, participative, and entertaining environment, in addition to improving oratory skills. In the recommendation section, the students proposed to complicate the game and extend it in several sessions to allow students to plot strategies of institutional redesign, organization of actors, or subvert the established order:

> More time is needed. I think professors should set a single standard: everything is allowed, just like in the real world. In this way, participants can draw up a broader strategy: social partnership, design new constituencies, increase the number of representatives or impose equitable taxes. If I knew there were no limits, I would have staged a coup d'état.

CONCLUSIONS

This paper contributes to the literature showing that active-learning methodologies positively impact students' short-term retention of factual and procedural knowledge about political systems. Our simulation was about resolving redistribution problems in a territory with two constituencies. Three elections were held, and students, who served as elected officials, made proactive policy decisions that altered the correlation of the system's political forces. With this role-play, we wanted the students of the Comparative Politics subject to understand the decisional and feedback dimension of the political system. By using Kahoot, we looked for a dynamic, competitive, and playful way to test their knowledge acquisition.

The quasi-experiment shows, as hypothesized, that students learned, on average, 39.3% more thanks to the role-play in experimental group 1 and 24.3% more in experimental group 2 over the control group. We were also interested in testing the explanatory power of sociodemographic variables. Students' GPA is the only sociodemographic factor with a statistically significant relationship with learning. A one-point increase in the GPA increases the learning about political systems by about 9.8%. The qualitative analysis provides valuable information on the competencies that were strengthened in the role-playing and the usefulness of the active-learning activity to teach students electoral formulas, the benefits of redistribution and commerce, and the complexities around decision-making while playing. The metacognitive dimension of the simulation shows that students perceived themselves as better trained in complex phenomena and concepts articulation while simulating the processes, institutions, and actors of the political system. Students' opinions also reveal the positive effect on increased fun, self-confidence, peer learning, and participation in the class while confirming the complementarity of these techniques with traditional lectures, where there is more time for analytical and depth thinking.

These results represent a challenge for most of us, trained under the traditional teaching model and a constant adjustment of the innovation and teaching quality units of the universities. With a view to the external validity of the results, we aim to continue developing and strengthening the role-playing game, expanding the number of participants, including students from other universities, and randomly assigning them to the experimental and control groups to limit the identified biases.

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