

# Transforming tourist maps to increase heritage awareness uses for gamification and serious games

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## Abstract

Game-based approaches like gamification and serious games generate nudging effects. This paper presents an experiment where undergraduate students (ns1=11 and ns2=10) played modified modern board games, transforming a tourist map into a playful approach. The test revealed that the chosen games (Just One and Spyfall) transformed the tourist map of Leiria city, Portugal, into a tool to generate awareness for urban heritage. Despite this success (discovering new heritage through player interaction and collaboration), the play environment, the mood, and the players' behavior affected the out-comes.

## Keywords

Nudge, Board Games, Gamification, Heritage, Serious Games, Tourism

## 1. Nudging challenges and game applications

Tourist maps present graphical representations of heritage attractions of a particular city that help tourists create mental images of space and ongoing activities [1]. However, these maps are merely informative and lack interactivity. We argue that combining maps with game elements engages users to address heritage. Game-based approaches can rely on users' agency to identify and explore heritage through available touristic maps.

Nudging can be defined as the techniques applied to affect people's choices [2] persuasively [3], such as promoting physical activity [4]. The boundary between manipulation and autonomy is an ongoing ethical debate because these approaches are common among commercial [5] and politics [6]. Departing from Sunstein [7] and Ly et al. [8] recommendations for nudges and their application to games by Sousa [9], we propose a method to transform touristic maps into a nudging activity to improve awareness about urban heritage. This prototyping approach can be transformed into digital gamification and serious games, relying heavily on player agency.

We present a case study where first-year undergraduate students tested a modified version of the Just One and Spyfall modern board games to play over a tourist map of Leiria city in the central region of Portugal. The games were played by groups and supported by a facilitator teaches the rules of the games, established the sequences of play, reflection, and debriefing about the experience of playing the games and the relations to urban heritage and its uses. Through the games, students identified heritage they previously ignored. The case study shows that these game modifications help support learning processes and explore touristic maps for heritage learning purposes. Despite this, game uncertainties, play environment, and player behavior can affect the success of the experience.

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## 2. The importance of urban heritage awareness

Tourism is an economic activity with a high impact on territories [10, 11]. Tourism can lead to changes in the economy and controlling how touristic activities develop is part of the challenge of managing this complex activity of safeguarding local identity [12, 13] and avoiding damaging usage or neglecting local heritage [14, 15]. We propose to find playful ways (e.g., game adaptations) to use existing resources (e.g., tourist maps) that help citizens recognize the existing heritage.

Games are popular and are getting attention due to their increasing economic impact [16]. Gamification and serious games keep appearing everywhere [17]. Here we define gamification as introducing game elements in non-game activities and serious games that demand creating a game to achieve predefined purposes beyond entertainment [18–21]. We aim to help students identify and discuss urban heritage issues by themselves (nudging), using methods that might be replicable in other platforms.

Analog games can easily be transformed and adapted (removing or adding new elements) to fit purposes. When using analog games, it is possible to foster a more collaborative approach and profit from the higher player agency [22, 23], more with modern board games [24–27]. When using modding techniques, designers are learning, and training how to develop game-based for gamification and serious game applications since they depart from solid game systems and well-tested games.

Although we are using an analog approach, this is a method to prototype and test the game system. This test is a previous step to implement digital and hybrid solutions since many video games are developed first by playtesting analog versions [30, 31].

## 3. The importance of urban heritage awareness

We modified two modern board games with simple rule sets and a tourist map of Leiria city to explore local heritage. Two classes ( $S1_{nS1}=11$  and  $S2_{nS2}=10$ ) for the undergraduate students of environment and heritage at the Polytechnic of Leiria, School of Education and Social Sciences, played the same game sequence to identify and share their knowledge about local urban heritage. The same facilitator did the game modding, supported gameplay, and debriefing [32]. Data collection consisted of a pre-test/post-test questionnaire following Mayer et al. [33] for serious game evaluation (Likert scale 1 to 7 and free comments), as tested in similar modding approaches [29, 34, 35]. There were questions about the game habits, enjoyment, and ability to learn through the game (Table 2). The facilitator's observations complemented the questionnaires.

### 3.1. Using games for heritage identification in class

Complex board games, with many rules and mechanisms, can be problematic for users with low game habits and reduced time to learn and replay them until they are comfortable with the activity [29, 36]. As in other case studies that used games with low complexity (according to BGG) [26], we selected two popular “party games” [24] because they have low complexity, are fast to learn, and can be played by more than six players simultaneously. This fits the requirements for a standard class session.

We chose to use Just One [37] and Spyfall [38], following similar modding approaches as in previous experiences, altering the games to achieve serious purposes beyond entertainment, like testing ideas and sharing information among participants with communication restrictions [35, 39]. Restraining communication relates to game mechanisms [10] and ways to deliver to implement the prerequisites of Habermas's rational communication theory. According to this theory, collaboration requires equality in decision-making, communication, access to information, and shared goals [40].

Table 1 presents the characteristics of the selected games and the level of modding done to implement the game-based process that consisted in playing Just One to identify heritage sites

and playing Spyfall to explore those sites over a tourist map with more detail for the city of Leiria. We maintained the player agency of the original games while enabling them to fit the issues at stake, in this case, heritage issues. The game results were not random. They resulted from the players' decision-making and multiplayer interactions.

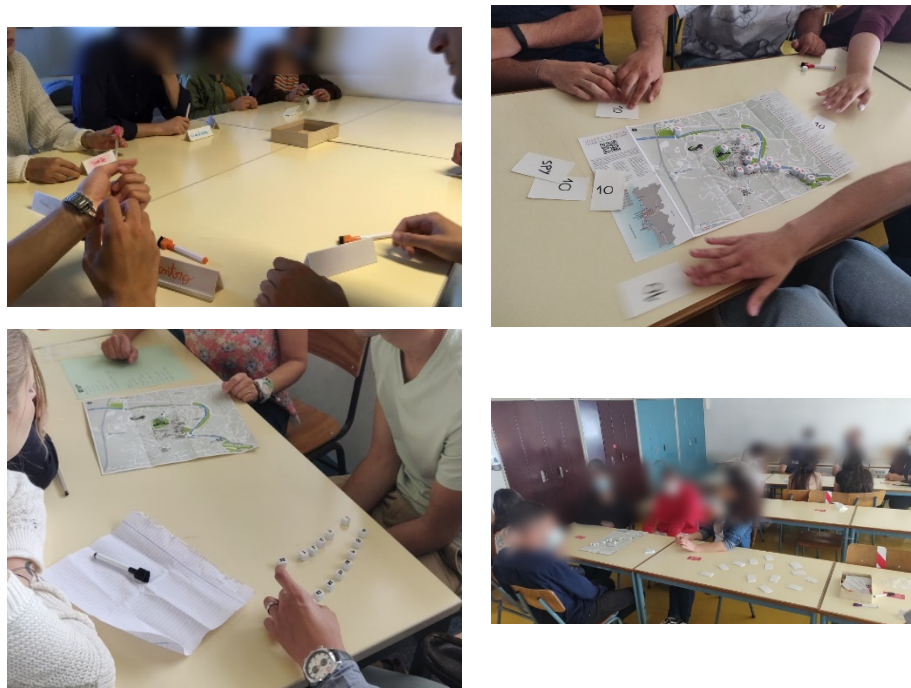
**Table 1**  
**Modding dimensions of the selected games.**

Game	Play Time (min.)	Completeness BGG (1-5)	Game overview	Material Modifications	Gameplay Modifications	Expected outcomes
<i>Just One</i>	20	1.05	Collaborative game. Players guess the most words possible. In each turn, a player must guess the word based on the clues other players give. Repeated hints are removed.	Ignoring the cards of the original game.	One player chose a heritage site and wrote it on the plastic piece. The second player tries to guess based on the clues.	Identify heritage sites through clues and think about other ones that were ignored.
<i>Spyfall</i>	15	1.25	Team's game. A player plays the spy (ignoring the location). Players ask each other's "yes" or "no" questions until time runs out, vote to find the spy, or the spy finds the location.	Add blank cubes to write the heritage locations' numbers over the map.	Players use cards with numbers representing the sites on the map (number of the blank cubes).	Explore each heritage and its relationship with the city.

In Figure 1, students are playing Just One to identify different heritages. Then they selected the 15 heritages (places and non-material ones associated with places). Each heritage corresponds to a number they wrote in the blank cube, adding it to the map. One sheet of paper presented the list of the 15 heritages associated with the numbers.

#### 4. Data analysis

Students were, on average, 20 years old, and the gender self-identification was balanced. Students needed to learn the games and play similar ones. We tested the statistical significance through the T-Student one-tail paired test (Microsoft Excel), comparing the students' perceptions before (pre-test) and after (post-test) playing the games. When comparing pre and post-tests, participants recognized the game fostered their imagination (+0.727;  $p=0.044$ ) and reinforced their confidence in identifying heritage (+0.600;  $p=0.026$ ).



**Figure 1:** Playing Just One (top-left) and playing adapted Spyfall (top right and bottom).

**Table 2**

**Final game affects questions in both sessions.**

Sessions	(1) Games potential to identify and learn about urban heritage?		(2) Would you play the games just for fun?	
	$\bar{x}$	$\sigma$	$\bar{x}$	$\sigma$
S1	6.27	0.86	6.36	0.77
S2	5.50	1.29	4.90	1.38

Table 2 shows the results regarding the purposes of the games to generate heritage awareness and deliver a fun experience. Although the results from S1 seem better, none had statistical significance. The students' commentaries revealed that in S1, seven participants reinforced their enjoyment (64%), while only two stated that in S2 (20%). In S1, two students said they enjoyed all parts, whereas none in S2. In S2, students highlighted (serious) outcomes related to gameplay, ignoring the enjoyment dimension.

In S2, two students referend to some uncomfortable interactions, while none in S1. In the negative comments, in S1, two students wanted to play more (14%), and in S2, it was only one (10%). We can consider the desire to play as an engagement. Students involved in S1 enjoyed the session more. Although the session was similar in both cases, the main change was the participants. The facilitator's observations also reinforce this perception. In S2, it was necessary to solve some conflicts between students. One student undermined the game, showing forbidden information. This failure affected the group experience (S2). Nothing similar was noticed during S1. Later, the facilitator realized an exam stressed the S2 students they would take after the session. In both sessions, the facilitator noticed that students were curious about the experience, asking continuous questions about the game approach and its purposes. However, this engagement decreased in S2 as the downtime and waiting time accumulated. During both sessions, students shared several parallel stories, like activities related to the heritage being explored in a specific part of each game (e.g., places they hang out with their friends).

## 5. Discussion and future applications

Through the games, students discovered and identified local urban heritage related to the city of Leiria (Portugal). Playing the games allowed students to discuss, share information, and identify heritage values (approximately 20% more).

The experience could have been more enjoyable than expected. Session 2 (S2) had some issues, and the games were not engaging as in session 1 (S1). Player behavior and external factors like the exam affected the experience. Despite this, students successfully identified and discussed urban heritage (15 locations at least). At the start of the sessions, students stated they were unaware of local heritage. This positive result reinforced students' learning ability through collaborative game dynamics, discussing, sharing information, and thinking about heritage issues.

In S1, students played without conflicts or negative reactions, affecting the result and perceptions. Time is an issue because students may want to play more and finish the game. Having the proper time to explain the games and do the game debriefing is mandatory. Enough time can reduce conflicts and highlight the purposes of the game, like reinforcing the players' behavior regarding learning issues. In S2, players' conflicts and the upcoming exam stress decreased their enjoyment, although students recognized that the games helped them learn more about heritage. These different effects reveal some of the challenges of using games for purposes. Balancing the entertainment and the serious outcomes can be a challenge. Adding to the uncertainty games generate, the players' behaviors and the group's social-emotional mood are highly influential.

Facilitators must react to the players' reactions (solving conflicts and exploring the emergent parallel stories) and deal with game prejudices (e.g., games are for children and are not a serious activity [41]). During the Spyfall explanation (in S2), one student said: "you thought in everything, now I understand why we are doing this...". Dealing with player profiles is part of the facilitation process, stating that different players and circumstances would react differently to game approaches [34, 42]. This player behavior reinforces the social contract of multiplayer games [43, 44]. This is not to say that the students did not enjoy the game session, but a longer duration is needed in the future [45] to explore the perceived effect of nudging among them. Students were, on average, 20 years old, and the gender self-identification was balanced. Students needed to learn the games and play similar ones. We tested the statistical significance through the T-Student one-tail paired test (Microsoft Excel), comparing the students' perceptions before (pre-test) and after (post-test) playing the games. When comparing pre and post-tests, participants recognized the game fostered their imagination (+0.727;  $p=0.044$ ) and reinforced their confidence in identifying heritage (+0.600;  $p=0.026$ ).

## 6. Conclusion and future applications

For a deeper evaluation of the nudging effect, applying constructive theories to engage students in the game session and design thinking as a student-centric approach could be utilized [46] and even individually considering each student's needs of autonomy, competence, and relatedness [47] to increase heritage awareness about urban heritage among the students.

Future applications could explore the same game approach for different maps and evaluate the awareness of other urban dimensions. Also, adapt and test it with digital maps in online play to engage past and future visitors of a city. Municipalities of tourist agencies could explore this opportunity. Also, the publishers of the games could create new versions of the games and investigate their intellectual property as serious games, being another business opportunity or a way to develop social responsibility projects related to heritage protection and community empowerment through heritage.

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