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# Didactic use of GIS and Street View for Tourism Degree students: understanding commercial gentrification in large urban destinations

*Uso didáctico de SIG y Street View en el Grado de Turismo: aproximación a la gentrificación comercial en grandes destinos urbanos*

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## Abstract

Tourism gentrification, as a complex phenomenon in large urban destinations, is an important topic for future tourism professionals. The aim of this paper is to offer a digital cartography making activity based on the contemporary dynamics of commercial transformation within tourism gentrification contexts in Madrid in order to facilitate its understanding. This innovative teaching activity is in accordance with the sustainable tourism pedagogy approach and follows an active methodology using three different GIS applications: Google Street View, ESRI ArcGIS Desktop and ESRI ArcGIS Online Story Maps application. A 4-phase methodological design is proposed so that the activity is customizable (1- recognition of previous ideas), achievable (2- significant streets' mapping), collaborative (3- collective idea-sharing) and replicable (4- academic and didactic evaluation). Finally, the results from an initial implementation are brought to light: i) an initial conceptual lack was found, ii) examples that help to see the proposal materialized are shown and iii) expected positive consequences according to the scientific literature are presented. It is concluded that, despite the scarce bibliography, the use of GIS software and Google Street View in tourism higher education is convenient, not only to facilitate the learning of complex territorial phenomena but also to learn digital tools highly valued in the professional field.

**Keywords:** ArcGIS; ESRI Story Maps; Urban Tourism; Tourism Gentrification; Tourism Didactics; Higher Education.

## Resumen

La gentrificación turística es un fenómeno complejo, pero su actualidad en grandes destinos urbanos lo convierte en un tema importante para los futuros profesionales del turismo. Para facilitar su comprensión, el objetivo de este artículo es presentar la realización de cartografía digital propia sobre la transformación comercial que se está produciendo en Madrid en contextos de gentrificación turística. En sintonía con la pedagogía del turismo sostenible, se presenta esta estrategia didáctica innovadora basada

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en una metodología activa que se sirve de tres aplicaciones del ámbito de los SIG: Street View de Google, ArcGIS Desktop de ESRI y la herramienta de Story Map de ArcGIS Online. Se propone un diseño metodológico en 4 fases para que la actividad sea personalizable (1- reconocimiento de ideas previas), realizable (2- mapeo secuenciado a partir de calles de estudio significativas), colaborativa (3- exposiciones y debate) y replicable (4- evaluación académica y didáctica). Finalmente, se adelantan los resultados a partir de una puesta en práctica inicial, entre los cuales destacan: i) una carencia conceptual inicial, ii) ejemplos que ayudan a ver materializada la propuesta y iii) consecuencias positivas esperadas según la literatura científica. Se concluye que, a pesar de la escasa bibliografía, el uso de softwares de SIG y el uso de Google Street View en la formación superior de turismo es conveniente, no solo para facilitar el aprendizaje de fenómenos territoriales complejos sino también para conocer herramientas digitales muy valoradas en el ámbito profesional.

**Palabras clave:** ArcGIS; ESRI Story Maps; Turismo urbano; Gentrificación turística; Didáctica del turismo; Educación superior.

## 1. Introduction

Tourism is a modern phenomenon that has important effects on the culture, the environment, and the economy of societies throughout the World (Santamaria & Filis, 2019). Currently, one of the major focuses is on the impacts of tourism in urban centers (Novo Malvárez, 2019). Embedded in the broader context of globalization, the process of “touristification” refers to the intensification of tourist use in urban central spaces (Navarrete Escobedo, 2017). Touristification symptoms are the proliferation of tourism businesses, such as boutique hotels, but also tourist apartments massively available through P2P platforms that penetrate the residential districts; the growth of leisure activities, and nightlife in particular; the disappearance of traditional and local businesses, giving way to large global brands; and the displacement of the resident population (García-Hernández, De la Calle-Vaquero, & Yubero, 2017). As growth of urban tourism persists, processes of urban gentrification have been observed. Gentrification caused by tourism is affecting a growing number of cities around the World, specifically in Europe, and thus it is a relevant issue in the 21<sup>st</sup> century (Gravari-Barbas & Guinand, 2017; Calle-Vaquero, 2019).

The transfer from the universities of updated knowledge and critical interpretative frameworks of social reality is a challenge, and it is an even greater challenge to convey the values of coexistence, respect, empathy and sustainability. The activity presented here follows a Sustainable Tourism Pedagogy (STP) approach which advocates for a sustainable tourism education in continuous co-creation among the whole society (Jamal, Taillon, & Dredge, 2011; Prebezac, Schott, & Sheldon, 2014). Making the complex realities of tourism in the city discoverable to future tourism professionals contributes to the reduction of the existing distance between the knowledge generated in the university and tourism education at all levels (Belhassen & Caton, 2011).

In this context of pedagogical need —from a theoretical and an ethical point of view— this work follows research developed previously (Martínez-Hernández & Yubero, 2020). Assuming the didactic difficulty of the topic, we present an innovative teaching activity with Tourism Degree students. Its main objective is to facilitate the understanding of contemporary dynamics of commercial transformation in contexts of tourism gentrification. This activity uses an active methodology following a constructivist conception of learning (Beltrán, 1993). The development of curricular contents and competences is sought in its application. The main resource of the activity is the Geographic Information Systems (GIS): ESRI's ArcGIS Desktop help us georeference, for a current moment and a past moment, retail businesses on several streets of the city of Madrid identified thanks to Google Street View. The result is the creation of a cartographic comparator in ArcGIS Online Story Maps application to explicitly visualize the commercial transformations of each selected street.

Madrid was selected for two reasons. First, it has already been studied as an example of touristification and gentrification processes, specifically in a commercial perspective (Sequera & Janoshka, 2015, 2016; Calle-Vaquero, Ferreiro-Calzada, & Mendoza-de Miguel (2018); Crespi & Domínguez, 2016; Barado-Timón & Hidalgo-Giralt, 2019; Velasco *et al.*, 2019); and second, it is a well-known city for the target students as they live there or, at least, as they are studying there as explained below. It is widely accepted that near and well-known spaces help students get a more significant learning in global geographical phenomena (Benejam, 1992; Pagès, 2009).

Touristification calls into question the complex, rich, diverse and locally sustainable meanings of each society. As it is established in the STP (Jamal *et al.*, 2011), only a sustainable urban management approach based on spatial justice values can bring the coexistence of the different uses in the city. The current moment is crucial for the awareness of future tourism professionals in the new challenges that take place in urban spaces and the use of GIS software and familiar data sources such as Google Street View help apprehend it in an innovative way.

This study aims at students taking the module “Planning of Tourism Destinations” within the Tourism Degree at the University Complutense of Madrid (UCM). Expected results are anticipated from an initial implementation in the 2<sup>nd</sup> semester of the 2019/2020 academic year, which could not be completed due to the long and strict period of class suspension caused by COVID-19 (UCM, 2020).

## **1.1. Theoretical framework**

### **1.1.1. Commercial gentrification and Tourism gentrification**

The concept of gentrification designates a process that combines the rehabilitation of urban centers with population substitution by residents with greater purchasing power causing an increase in the cost of access to housing and the dismantling of traditional businesses (Clerval, Colomb, & van Crieckingen, 2011). The increasing tourist functionality of urban spaces, also known as “touristification”, is related to the last modality of gentrification (Aalbers, 2019; Clerval *et al.*, 2011; Cócola-Gant, 2015). The concept of “tourism gentrification” critically provides new insights into the processes shaping contemporary tourism, contextualizing it in the neoliberal turn of the city’s production (Gravari-Barbas & Guinand, 2017).

One of the most studied tourism gentrification vectors is the introduction of tourist apartments in residential areas with the help of P2P platforms such as AirBnB (Wachsmuth & Weiser, 2018; Ioannides, Röslermaier & van der Zee, 2019). As new urban spaces become accessible and “trendy for tourism”, they are transformed according to the consumption needs of affluent consumers, whether tourists or residents. This has been identified as a “commercial update” which, in turn, works to attract more tourists (Fainstein & Gladstone, 1999). Stores that supply goods and services of daily necessity are replaced by those that address “affluent” needs dismantling the traditional businesses and in consequence causing commercial gentrification (Blázquez-Salom Blanco-Romero, Gual-Carbonell & Murray, 2019; Cócola-Gant, 2018; Gotham, 2005; Romero & Lara, 2015).

Commercial or retail gentrification refers to the displacement of traditional and local stores and their substitution by boutiques, trendy cafes and franchises (Hubbard, 2016). Commercial gentrification is triggered not only directly (by an increase in rents prices) but also indirectly because of forced dispossession, produced by the feeling of discomfort in daily life due to the increasing difficulties caused by the qualitative change of space (Cócola-Gant, 2018). In fact, several authors have studied how the new cosmopolitan middle class reproduces similar urban environments wherever it goes or settles causing the change of urban landscapes and the loss of previous urban identity (Zukin, 2010; Maitland, 2010; Hiernaux & González, 2014; Urry, 1990; Larsen, 2019). These processes have led to new forms of conflict in the city (Colomb & Novy, 2016).

For instance, traditional food markets have been adjusted to this upgrading (Gonzalez & Waley, 2013; Crespi & Domínguez, 2016). Extensible to commercial streets, the process of food markets requalification does not try to destroy the commercial functionality but rather to produce new commercial spaces where “authenticity” is recreated, and shopping is encapsulated as a leisure experience. Commercial gentrification has been observed in many European tourist capitals such as London, Barcelona, Paris or Madrid (Sequera & Janoshka, 2015; Colomb & Novy, 2016; Gravari-Barbas, 2019; Freytag & Bauder, 2018).

In order to identify commercial gentrification in Valencia, Romero and Lara (2015) propose a commercial-based mapping where premises are divided into 4 large groups: closed premises (important for temporal monitoring), traditional commercial premises (i.e. bars, bakeries, furniture shops or hairdressing salons) and gentrifying commercial premises that correspond to a type (decoration, fashion, restoration or culture) and an appellation (vintage, creative spaces, gastro- and eco- or bio-). They set several indicators to identify gentrifying premises such as: recent opening; type of goods or services sold; national or foreigner customer orientation of a greater purchasing power; avant-garde, vintage or “authentic”

design that justifies an increase in prices; change in the owner; and use of culture oriented towards elite consumption (the new premises are cafe-bookstores, shops-galleries, etc.). To this series of indicators, others can be added such as the opening hours or the languages displayed at the shop windows, as García-Hernández *et al.* (2017) apply in the Spanish city of San Sebastián.

Regarding the research methodologies, conventional techniques include census data treatment (sometimes in GIS), fieldwork, surveys and in-depth interviews. However, with great potential is the Street View tool embedded in Google Maps which has been considered only recently and exceptionally as an important data source in tourism research (Ilic, Sawada, & Zorzelli, 2019).

### 1.1.2. GIS as a didactic resource

Teachers must feel comfortable in the teaching use of Information and Communication Technologies—ICT— (Amorós Poveda & Díaz Méndez, 2012), as the current educational environment is immersed in the information society (Hernández Martín and Quintero Gallego, 2009).

The examples of ICT applications in the educational field are huge (Kubricky & Cástkova, 2015). Specifically, in subjects of a territorial nature, such as tourism, the application of ICT to space is very common, called Geographic Information Technology—GIT— (Ventura Rodríguez de Castro & Crespo Castellanos, 2019). One of the GIT tools that has been most developed is the Geographic Information Systems—GIS—, whose main functions are to capture, analyze, store, edit and represent geo-referenced data (Korte, 2001).

Being recent GIS use in teaching, it is nonetheless widespread in many countries, more through specific experiences than as curricular content (Milson, Demirci, & Kerski, 2012). In Japan, for example, where GIS is common for educational purposes, a lack of teacher training is recognized (Yuda & Itoh, 2006). In the USA, its use is mainly due to local initiatives (Sinton, 2012). The EU does have a long tradition of institutional support for educational proposals on GIS, for example with a pioneering 2003 project called “GISAS” (Borghs, M., & Johansson, 2009). There are countries like Germany where something similar happens; See for example the project “GIS4schools” (Demharter, T., & Michel, 2012). Spain has received support for the educational use of the GIS through organizations specialized in territorial sciences such as the National Geographic Institute, a pioneer in presenting digital cartographic resources through its “Educa IGN” application (Velasco Tirado & Sevilla Sánchez, 2019), as well as powerful private organizations such as the global cartography company ESRI, through applications such as the “Atlas Digital Escolar” (Lázaro Torres, Miguel González, & Morales Yago, 2017), but GIS does not have a curricular presence in the primary and secondary education curricula.

The use of GIS as a teaching resource, through specific software or webGIS, is more frequent in the teaching of Geography and related disciplines (Jones, Blake, Davies, & Scanlon, 2004; Martínez Fernández & Delgado Urrecho, 2017), where we can find many experiences at all educational levels, for instance: Ventura Rodríguez de Castro & Crespo Castellanos (2019), Martínez-Hernández & Martínez-Hernández (2018), Lázaro Torres, Miguel González, & Morales Yago (2017), Buzo Sánchez, Lázaro Torres & Mínguez García (2016), Ibarra Marinas, Martínez Hernández, Rubio Iborra, Pérez Resina, & Figueres Cuesta (2015), Martínez Hernández (2014a), Buzo Sánchez (2011), Nieto Masot (2010), Luque Revuelta (2011), Capel (2010). Other GIS applications have a great potential for education such as Google Street View. It is a free and fully accessible tool to the public that provides the virtual experience of walking down the street and provides up to around 10 years of imagery archived that is useful to see the changes in the urban landscape (Anguelov *et al.*, 2010). However, the educational use of Google Street View is more recent and less widespread (Carbonell-Carrera & Saorín, 2017).

In the didactics of tourism, the use of GIS is less extended (Stankov, Durdev, Markovic, & Arsenovic, 2012), despite the fact that they are generalized in research (Jovanovic & Njegus, 2008) and the fact that a good use of the GIS is acknowledged to be a competitive advantage for tourism professionals (Buhalis, 1998; Daniele & Mistilis, 1999; Cantoni, Kalbaska, & Inversini, 2010). Some university proposals for training in GIS and Tourism are those by Guyette (2003) for the USA, Sigala (2012) for Greece and Stankov, Durdev, Markovic, & Arsenovic (2012) for Serbia. Chiao, Chen, & Huang (2018) do the same in China also using Street View tools. In the scientific literature, no innovative teaching experiences have been found specifically about tourism gentrification. There seems to be a significant bibliographic deficiency in this area of tourism teaching.

For our teaching activity ESRI's ArcGIS software has been chosen, as it is the most powerful on the market for digital cartography (Law & Collins, 2018) and for which the university has a corporate license, the Story Maps tool for its online version and the application Street View from Google, whose diachronic data availability, free access and widespread use allow students to easily approach commercial transformation in large urban destinations and to use it as the basis for their cartography. The activity is designed to be carried out in practical classes, that is of no more than 50 students.

## 1.2. Curricular framework

Since the incorporation of Spain into the European Higher Education Area, the curricula on tourism have incorporated current multidisciplinary topics and methodologies (Ceballos Hernández, Arias Martín, Ruiz Jiménez, Sanz Domínguez, & Vázquez Bermúdez, 2010) such as tourism gentrification. One of the subjects that addresses this topic is "Planning of Tourist Destinations", taught in the 2<sup>nd</sup> course during the 2<sup>nd</sup> semester in the Tourism Degree of UCM. Covering 6 ECTS, its teaching is assigned to the Department of Geography (UCM, 2019a).

Our activity aims at covering two of the curricular contents established in the Teaching Record (UCM, 2019b): i) "Problems, agents involved and ways of intervention in urban destinations", and ii) "Techniques and instruments for the analysis and diagnosis of tourist destinations". The activity will focus on gentrification, as one of the main recent problems in urban destinations, using diagnostic techniques, such as the tourism categorization of commercial shops, the chronological mapping with GIS and Google Street View, and the collective idea-sharing task. These techniques will help recognize the agents involved and the means of intervention in the urban destinations affected by this phenomenon.

In accordance with the STP (Jamal *et al.*, 2011) and the pedagogical nature inherent in tourism by Mair & Sumner (2017), the activity also seeks to develop specific curricular competences of the Tourism Degree: CE5 ("Apply research methodology to solve the empirical problems that arise in the field of tourism") and CE18 ("Analyze the impacts generated by tourism and manage the territory in accordance with the principles of sustainability").

In sum, considering all these curricular elements (contents and competences) our teaching proposal is based on the following development of conceptual, procedural and attitudinal contents:

1. Destination Impact Analysis: types of commercial transformation driven by large brands or franchises, new locations, *gourmetization*, *hipsterization*, exoticism, opening of bar / restaurants, *folklorization*, increased nightlife activities, etc.
2. Consequences of the commercial transformation: among others, replacement of some businesses by others, commercial upgrading, closure, price increases, occupation of public space, changes of use (cinemas and theaters that become stores), expulsion of low-income residents and symbolic changes in space.
3. Causes of the commercial transformation: changes in consumption patterns (residents and tourists), business urban planning, globalization.
4. Diagnosis of the changes in space: some peripheral districts become fashionable and touristified.
5. Methodology: space indicators such as business' closure, empty premises, types of products sold, commercial upgrading, schedules, languages spoken or exposed.
6. Definition of the problem in urban tourism destinations: How to distinguish the use made by residents and tourists considering the Post-tourist theory ("leisure residents" vs. "tourists who want to experience the life of a resident")? Does tourism gentrification exist? How can it be identified? To what extent is tourism the cause?
7. Madrid districts as major components of urban tourism destinations, as other global cities.

## 2. Methodology

Based on the previous theoretical and curricular considerations, we propose a teaching activity sequenced in 4 methodological phases (Table 1).



Table 1. Phases of the didactic sequence for the teaching activity

Phase	Aim	Number of sessions/hours	Tools/Applications
I	Recognition of previous ideas	1	Google Form
II	Cartographic digitalization	3	ArcGIS Desktop and Google Street View
III	Collective idea-sharing	1	Story Maps (ArcGIS Online)
IV	Evaluation	1	Google Form

Own elaboration

### 2.1. Phase I: previous ideas

Although the educational curriculum ensures common learning around the topic under study (see section 1.3), not all students acquire it in the same way, at the same pace or with similar depth (Montero Segura, 2017). In order to adjust further phases of the teaching sequence with greater rigor and personalization (see section 3.2), it is necessary to gather precise information about the previous knowledge of the students. One way of doing this is through an anonymous questionnaire (Mora & Herrera, 2009), with questions adjusted to the curricular content to be worked on (Table 2). To standardize the results of the questionnaire, a list of 3 possible answers is proposed for each question, of which only one is undoubtedly correct (Table 2).

Table 2. Questionnaire of previous ideas and relation to the curriculum (see section 1.3)

Nº	Question	Answers (the correct one is underlined)	Own development of curricular contents
1	Recently, a remarkable phenomenon of commercial transformation has been taking place in some neighborhoods on the outskirts of the traditional centers of urban tourism; what does it consist of?	a) Proliferation of traditional shops. b) <u>Replacement by tourism oriented shops.</u> c) Widespread closure of shops of any kind.	1
2	What are the consequences of this commercial transformation in the area?	a) <u>Increase in prices, increased occupation of public space and tourism saturation.</u> b) Lower prices, increased occupation of public space and tourism saturation. c) Maintenance of prices, release of public space and tourist dispersion.	2
3	What consequences does this commercial transformation have on the local population?	a) <u>Expulsion of low-income residents.</u> b) Attraction of new low-income residents. c) Expulsion of higher income residents.	2
4	This commercial transformation is due, among other aspects, to changes in consumption patterns, basically:	a) Contempt for major brands. b) Austerity in tourist spending, especially during the economic crisis. c) <u>Confluence of commercial demand between residents and tourists.</u>	3
5	What is the name of the process according to which the tourist use of a space is considerably intensified?	a) Tourism gentrification. b) Tourism saturation. c) <u>Touristification.</u>	4
6	What is the name of the process according to which there is population substitution in a place due to the increase of prices for a higher tourist use?	a) <u>Tourism gentrification.</u> b) Tourism saturation. c) Touristification.	4

7	What is the name of the process according to which the carrying capacity of a tourist destination is exceeded?	a) Tourism gentrification. b) <u>Tourism saturation.</u> c) Touristification.	4
8	The post-tourist theory argues as follows:	a) The number of non-European tourists is steadily increasing every year. b) Tourists nowadays make more use of new technologies and social media. c) <u>Living as a local is a growing tourist motivation.</u>	6
9	Which of the following observable elements of space can become an indication of the functional change of a neighborhood towards increased tourist use?	a) A grocery store maintained over time and without problems of viability. b) <u>Commercial upgrade from a more traditional type of shop to a more hipsterized one.</u> c) Proliferation of bars and restaurants with menus written in Spanish.	5
10	Which of the following areas of the city of Madrid is undergoing the most important process of transformation due to the increase in tourist use?	a) Chamberí. b) Arguelles. c) <u>Malasaña.</u>	7

Own elaboration

The information on previous ideas acquires great importance under the constructivist paradigm of learning, according to Piaget, Ausubel, Vygotsky and Bruner, and based on the idea that the knower is the lead actor of his/her learning based on his/her previous ideas, which he/she modifies and reconducts in order to shape the new information and thus acquire new knowledge (Guerrero, 2006). With a questionnaire of previous ideas, not only vital information is obtained to personalize learning, but also each student is involved in the process. The student is considered as an autonomous, self-regulated being, who knows his/her own cognitive processes and has the control of learning at hand, becoming eminently active (Beltrán, 1993). From this perspective, the act of learning consists of establishing relations between the already acquired ideas and the new ideas proposed by the teacher. “When the student faces a new content to learn, he or she does so always armed with a series of concepts, conceptions, representations, and knowledge acquired in the course of his or her previous experiences” (own translation from Coll, 1990, p. 451).

The timing recommended for this questionnaire is 1 session, spending approximately 3 minutes per question (1 minute to read and understand the statement, 1 minute to read the answers and 1 minute to reflect on the correct answer). The rest of the session should be dedicated to explaining to the students the importance of being aware of their own knowledge starting point when undertaking a participatory learning process. To guarantee the validity of the answers, it is recommended not to allow access to notes or similar predefined materials. Besides, in order to ease the collection of information and its evaluative treatment, it is recommended to virtualize the questionnaire with, for example, Google Form, a free, open access and easy to use application.

## 2.2. Phase II: cartographic digitalization

In the session following the previous ideas gathering, the teacher will introduce the concept of GIS and will present the activity to be carried out, which will need at least 3 sessions. As it is a group exercise, working groups will be formed (between 3 and 7 members) and each group will be assigned a study street. It is very important to select adequate study streets, that exemplify very clearly the topic under study, have public georeferenced data of several years and are assimilable and comparable in terms of workload. Table 3 shows a list of adequate streets in the city of Madrid, whose total number would cover a class of up to 49 students, a value considered difficult to exceed for a practical university class.

Table 3. Proposal of streets in Madrid and justification as study cases

Street	Location	Characterization (own analysis and bibliography)	Years with data in Street View
Velarde	Malasaña	Neighborhoods of the historic center of Madrid, located on the outskirts of the major tourist attractions (Sol and Palacio neighborhoods), which have undergone a clear transformation and touristification accompanied by gentrification processes. They maintain their residential function but there is a proliferation of tourist apartments and commercial businesses embedded in the “hipster” culture (Calle-Vaquero, Ferreiro-Calzada, Mendoza-de Miguel, 2018; Pérez, 2013; Sequera & Janoshka, 2015; Crespi & Domínguez, 2016).	2013-2019
San Joaquín			2008-2019
Santa Bárbara			2008-2019
Regueros			2011-2019
Hernán Ckortés	Chueca		2011-2019
De la Victoria	Surroundings of Plaza del Sol	Heart of the urban tourism destination. One of the main tourism attractions. High presence of direct and indirect tourist activities, all with a long tourist tradition and generally based on the “souvenir” and the local traditional culture (Crespi & Domínguez, 2016).	2012-2019
Cabestreros	Lavapiés	A popular residential neighborhood with a traditionally low-income population (including foreign immigrants), which is undergoing a clear process of urban transformation with incipient signs of gentrification. There is a proliferation of tourist apartments and commercial businesses oriented towards “exotic” culture consumption, which is replacing old traditional businesses and businesses run by Chinese population (Sequera & Janoshka, 2015; Crespi & Domínguez, 2016; Barrado-Timón & Hidalgo-Giralt, 2019).	2008-2019

Own elaboration

After logging in with their corporate university account, each group will need to visualize their work street in ArcGIS Desktop by uploading an *OpenStreetMap* satellite image. On this image, used as a base map, they will have to create a new vector layer of points, in order to digitalize the shops and add data about their typology (Table 4) and tourism orientation (“high” or “low”, depending on the predominant orientation provided by criteria such as the type of goods or services sold, the opening hours, the languages of the shop window or the renovation of the front building). To obtain this information, which is as up-to-date as possible, and to be able to interpret it, they should open Google Maps application in their Internet browser and use the Street View tool to take a virtual walk along the study street. They will then need to gather the same information according to the oldest year archived in Street View. The data obtained are used to create the table of attributes of the digitized layer in ArcGIS. A space of subjectivity can be expected, as it is usual in social sciences, but all these previous criteria try to both homogenize the mapping decision task and compensate an out of place external validation. For a learning process, it seems preferable to draw a trend, instead of specifying indisputable data.

Digital cartography making is a very effective educational and analytical method in territorial studies of urban transformation as demonstrated by Queiroz Abreu Torres & Antunes Costa (2014) and it is central to this activity. Students will have to design two maps with the data in the vector layer, one for the present day and another for the oldest referenced year. The maps will show “high tourism orientation” shops by typology. In addition, they will have to enrich the maps with descriptive statistical information: on the percentage of these shops over the total number of shops in the street and, only for the present day map, also include the growth (positive or negative) of new tourism shops with respect to the oldest reference year. Finally, both maps must be uploaded to the Story Maps application of ArcGIS Online and a cartographic comparator must be created, which allows for the controlled overlapping of maps with the same spatial delimitation.



Table 4. Typology of shops

Housing
Tourist services
Parking
Tourist accommodation
Grocery
Museums and art galleries
Public services (school, library, etc.)
Catering
Fashion
Souvenirs
Private services (hair salon, bank, dental care clinic, garage, etc.)
Other shops
Closed

Own elaboration

### 2.3. Phase III: collective idea-sharing.

In the third phase, groups will visually expose their cartographic comparator to all their peers and explain the data elaborated. The objective is to argue the relationship between the results and the processes of commercial transformation in some districts of Madrid. Oral presentations are didactic strategies of proven effectiveness, if they are carried out in a planned and adequate way (Van Ginkel, Gulikers, Biemans, & Mulder, 2015). In consequence, it is recommended to give them a list of key guiding questions (Table 5).

Table 5. Guiding questions/considerations for oral presentations

Nº	Question/Consideration	Motivation
1	Street location with respect to the city's historic center and the main tourist attractions.	The first step in diagnosing a territorial phenomenon is to locate the area of study, allowing students to place it in its spatial context. The possible contexts are an already touristified area or an area becoming touristified.
2	Evolution of businesses on the ground floor, according to their typology.	Shop monitoring allows the students to know the commercial evolution of their study street.
3	Evolution of the tourism orientation of ground floor business, specifying a direct or indirect tourist activity.	By interpreting whether or not the previously established commercial evolution reflects a trend towards touristification, students can deduce whether and to what extent there has been a process of touristification.
4	In conclusion: Is your street occupied by many predominantly tourism-oriented shops? Has it always been like this?	Next, the diagnosis is explicitly exposed to help them deduce it.
5	Reflection: Why has this evolution occurred? What consequences can it have?	Finally, they are encouraged to reflect on possible causes and consequences, to intellectually challenge them to relate their theoretical knowledge on touristification and tourism gentrification processes, which will later be more explicitly activated in a large group discussion.

Own elaboration

The estimated time for each group's presentation is 5 minutes, at an average of 1 minute per guiding question. Once the groups have presented their cartographic comparators, a large group discussion will take place on the phenomena of touristification, commercial transformation and tourism gentrification, in order to explicitly relate this practical exercise to the theoretical contents of the subject. To guide the debate in an instructive way (De Grez, Valcke, & Roozen, 2009), a list of basic questions has been drawn up (Table 6), which is recommended to be completed with other personalized questions. New questions can cover unstable concepts shown in Phase I and during the groups' presentations. Teachers should manage the large group discussion in accordance with students' capacity for response, deduction, induction and reflection.

Table 6. List of basic guiding questions

Nº	Question	Motivation	Own development of curricular contents
1	What is the commercial transformation derived from touristification?	Each student group has diagnosed a process of commercial transformation in their study streets. This question allows them to relate it to tourism to understand its typology and causes.	1, 3
2	Has it been found on all the streets studied?	Not all study streets show the same phase or type of touristification. Here the students will be able to explicitly compare the different types of diagnostics carried out.	5
3	Why has it been found in some more than in others?	By asking them the reasons for these different diagnoses, students can better understand the changes in the peripheries of the urban tourist areas.	3, 4
4	Is that a good thing or a bad thing for tourism?	This question initiates the critical thinking of the students, who will have to reflect on the tourist consequences of these commercial transformations.	2
5	And for the residents? Is there a risk of tourism gentrification?	Here we extend critical thinking, by posing more variables: coexistence of tourism with the residential function, which can trigger a conflict of interests.	2, 6
6	Does this commercial transformation generate a sustainable use of space?	To complete the critical reflection, we incorporate a mention to sustainability in the use of urban space, so that the students link the phenomenon to the concept of sustainability.	2, 6
7	What measures can be established to manage touristification?	The last phase in the study of this phenomenon is the consideration of its management to avoid possible problems, so students are asked to think of corrective measures, based on those studied in theory.	6
8	Could you mention some areas of Madrid where you think a process of tourism gentrification is taking place?	Finally, students are asked to give examples of the problems studied that take place in their city, in order to consolidate the relationship between the theory and the cases worked on.	7

Own elaboration

#### 2.4. Phase IV: evaluation

In the current educational panorama, there is no doubt that all teaching activity must end with an evaluation of its effectiveness (Castillo Arredondo & Cabrerizo Diago, 2010). From an academic point of view, this evaluation can be done by repeating, also anonymously, the questionnaire of previous ideas,

understood now as a test of change and/or conceptual consolidation (Martínez Hernández, 2014b), so that only the improvement of the results would be a positive indicator of learning. However, to complete the evaluation, a new anonymous questionnaire focused on the didactic effectiveness is proposed (Table 7). The aim is to evaluate to what extent each element of the teaching activity has been adequate, from the point of view of the knower. To this end, a list of 10 questions has been drawn up with closed answer according to a Likert scale of values 1 to 5 (lower to higher level of adequacy). An eleventh optional open answer question has been added to this list as a box for opinions. The results of both questionnaires should help teachers reflect critically and acknowledge points of improvement (negative results) and points of consolidation (positive results) for possible future interventions. As Fuentes-Medina & Herrero Sánchez (1999) state, it is also advisable to share the results in class to facilitate feedback with a constructive approach.

Table 7. Didactic satisfaction questionnaire

Nº	Question
1	Have you learned to use a GIS in a basic way?
2	How important do you think learning to use a GIS can be in your training?
3	Have you understood what commercial transformation and tourism gentrification consist of?
4	How interesting do you think this didactic activity is compared to a conventional lecture?
5	How adequate has been the timing established to carry out the activity?
6	To what extent have you found the activity difficult?
7	To what extent has the didactic effectiveness of the exercise been enriched by collective-idea sharing in class?
8	Have the interventions of the teachers been helpful during the activity?
9	How do you value the overall didactic effectiveness of the activity?
10	To what extent have you enjoyed solving the activity?
11	Make any free comment about this teaching practice (how would you improve it, what didn't you like, what surprised you, what did you think in general...)

Own elaboration

### 3. Results

#### 3.1. Previous ideas: initial conceptual lack

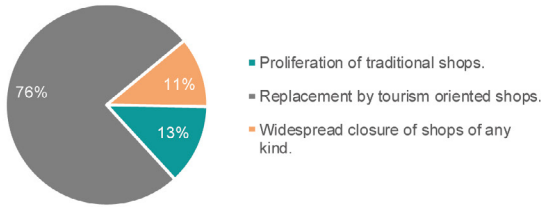
A total of 62 students answered the questionnaire of previous ideas. The consistence of this test was validated by Cronbach's Alpha, which indicates a moderate, almost good, consistence (0.51). Without high pretensions of statistical significance and considering that the teaching proposal was not able to continue, the results allows us to estimate the knowledge starting point of 2<sup>nd</sup> year Tourism Degree students about tourism and tourism gentrification. Most students have adequate knowledge of the topic, although none of the questions was correctly answered by all of them (Figure 1).

Most students identify the topic of study, namely the commercial transformation that is recently taking place in the peripheral neighborhoods of traditional urban tourism centers, but almost a quarter of them are confused about what this commercial transformation consists of. This result justifies the need for an effective learning. This point must aim for 100% right answers after implementing the teaching activity.

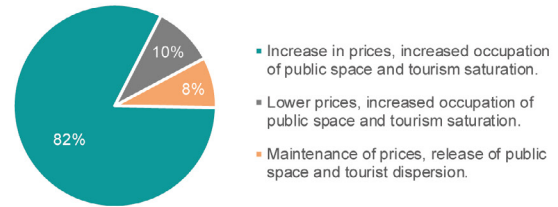
The consequences that commercial transformation has on space are better identified: price increase, higher occupation of public space and tourism saturation. Even so, 18% of students still confuse some of these consequences. Something similar happens when they are asked about population: almost 15% do not identify the expulsion of low-income residents as one of the major consequences. In the implementation of the activity, explicit mention should be made of each of the consequences so that students can interpret them significantly.

Figure 1. Results of the questionnaire of previous ideas

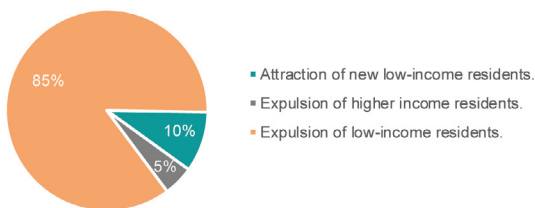
Recently, a remarkable phenomenon of commercial transformation has been taking place in some neighborhoods on the outskirts of the traditional centers of urban tourism; what does it consist of?



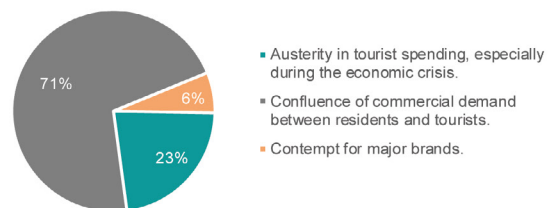
What are the consequences of this commercial transformation in the area?



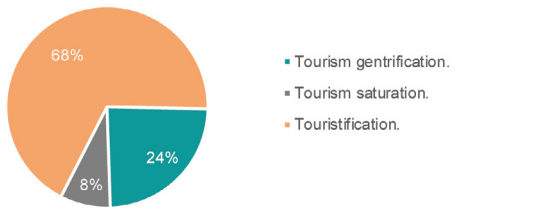
What consequences does this commercial transformation have on the local population?



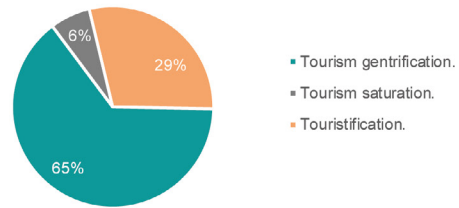
This commercial transformation is due, among other aspects, to changes in consumption patterns, basically:



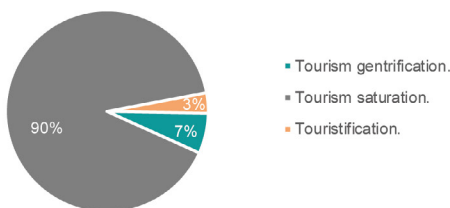
What is the name of the process according to which the tourist use of a space is considerably intensified?



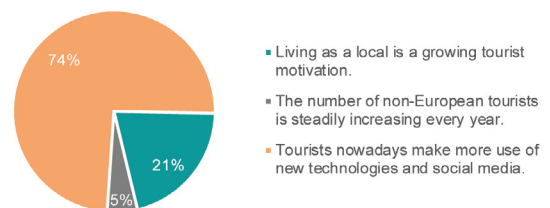
What is the name of the process according to which there is population substitution in a place due to the increase of prices for a higher tourist use?



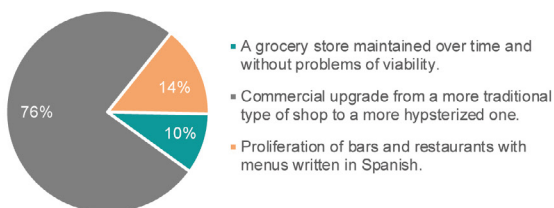
What is the name of the process according to which the carrying capacity of a tourist destination is exceeded?



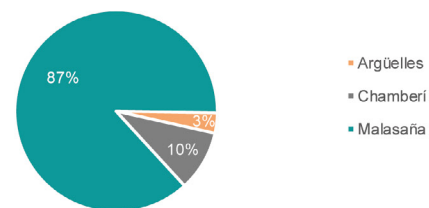
The post-tourist theory argues as follows:



Which of the following observable elements of space can become an indication of the functional change of a neighborhood towards increased tourist use?



Which of the following areas of the city of Madrid is undergoing the most important process of transformation due to the increase in tourist use?



Own elaboration

The causes of commercial transformation are known to a lesser degree. Almost 30% do not recognize the tendency of commercial demand confluence that has occurred between residents and tourists in large urban destinations. This would be automatically corrected as soon as students categorize shops since the products and services that they offer mostly reflect this evidence.

When asked to conceptualize touristification, tourism gentrification and tourist saturation, they only show a good knowledge of the latter concept, by up to 90% of students. However, between 32 and 35% do not distinguish the first two concepts. This means that there are students who know how to recognize tourism gentrification as one of the consequences of commercial transformation (see Figure 2) but they are not able to conceptualize it. This result is very important when applying the teaching activity because it warns us not to neglect the more theoretical aspects of the topic, and to ensure that practice and theory always go hand in hand.

In fact, even if 71% of students recognized the confluence of commercial demand between residents and tourists, only a mere 21% conceptualizes this trend according to the post-tourist theory in tourism and cultural studies. Of the entire questionnaire, this is the only question that is mostly answered incorrectly, by almost 80% of the students. As we said for the previous concepts, there is no doubt that a teaching effort must be made to avoid a dissociation between contents whose learning is of a more empirical nature and theory.

To assess the extent to which students understand the meaning of the methodological procedure that they are going to follow with the digitalization and characterization of shops, they have been asked to identify visible signs in the space that testify the ongoing process of commercial transformation. The result is good, as most students can recognize the commercial updating of more traditional shops towards more “hipsterized” ones as a sign. Even so, almost 25% do not see this indicator, so this will be necessarily explained further.

Finally, it is relevant to know if the students can localize the phenomenon in their geographical environment, since, if this is the case, the significance of the learning is increased. The result is very positive, since almost 90% recognize the process of commercial transformation in their city, specifically in the Malasaña neighborhood, where a large part of the streets of study of the proposal are located (see Table 3).

### **3.2. Mapping and collective idea-sharing management**

#### **3.2.1. Theoretical review**

Before the digitalization of shops, teachers should spend some initial time reviewing the most important aspects on the topic, emphasizing the knowledge starting point of students (shown in Phase I). Some initial knowledge about the phenomenon is required in order to further consolidate it through this teaching activity.

#### **3.2.2. GIS Presentation**

Once the theoretical framework of the topic to be addressed is clear, it is time to explain what GIS are, since for most students this will be their first digital cartography making activity. Given that the tools to be used during the activity are few and simple, it is recommended not to make the explanation about GIS too complex, but to try to give a brief presentation of basic aspects such as georeferencing, digitalization, attribute tables and the possibilities of symbols representation. The point here is to give a brief presentation because specific learning on how to use GIS will be possible when undertaking the activity with ArcGIS Desktop.

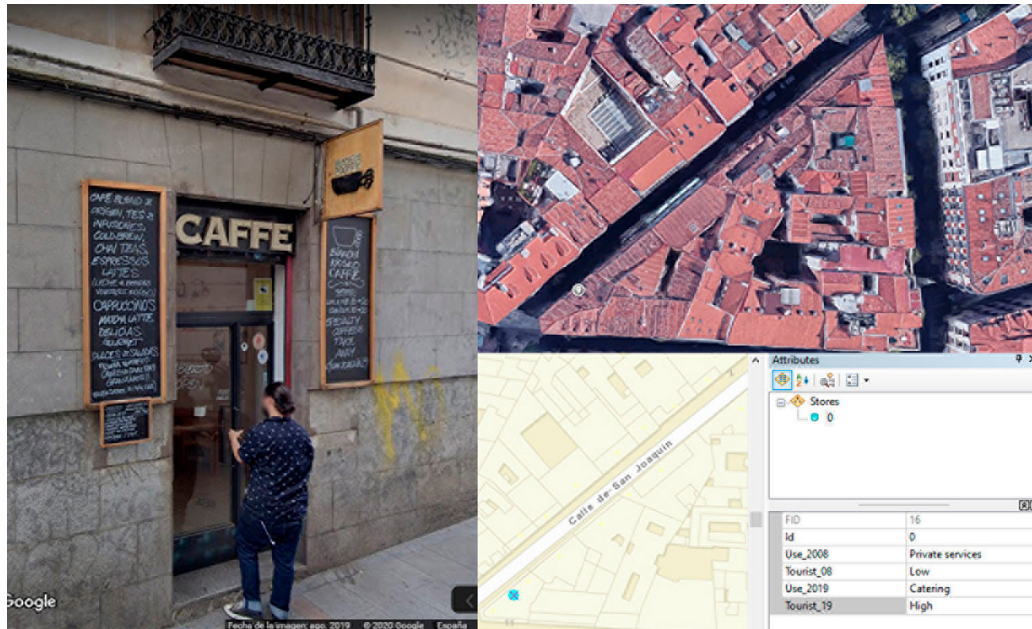
#### **3.2.3. Use of GIS applications**

The teachers can then propose the activity and assign each group a study street. The first task for students is to log in to ArcGIS, load an *OpenStreetMap* base layer and zoom into their study street. As this is the first time for most students, it is expected that this task, despite its simplicity, will take up a lot of time and generate insecurity among students. It would be normal for a whole class session to be taken up to this point.



In the next session, students should create a new layer of points in order to digitalize the shops on their study streets. They will be taught how to do this in ArcGIS and will be instructed to use the Google Maps Street View tool. In Figure 2 an example of the identification of a shop on Google Maps and then its digitalization in ArcGIS Desktop is shown.

Figure 2. Example of the identification of a shop on San Joaquín Street using Google Street View (left) and its digitalization in ArcGIS Desktop (right)



Own elaboration

This layer of points will store information on both current and old shop types. Students should learn how to use the timeline tool of Google Street View. An example is shown in Figure 3. Depending on the street of study, all kinds of cases may occur such as shops that did not exist before, others that existed before and are now closed, or simply shops that remain. The trend analyzed by the students of each group will serve to enrich the subsequent large group discussion, since the selection of streets is based on the representativity of many different situations. Learning by comparison will then take place.

Figure 3. Example for selecting the 2008 San Joaquín Street display using the Google Street View timeline tool



Own elaboration

The next task is to fill in the layer's database, adding new fields to the attribute table on the “typology” and “tourism orientation” of each record, that is, of each previously digitalized shop (see section 2.2). In this way, the students will have to apply theoretical content on urban tourism destinations. The teachers must support this task in order to seek students’ informed decisions and reduce subjectivity as far as possible. The result will be the creation of a georeferenced database on shops according to their typology and their higher or lower tourism orientation in each reference year. Figure 4 shows an example of the process of creating the database.

Figure 4. Example of attribute table for the layer of digitalized shops in San Joaquín street (Use\_2008: typology of the establishment in 2008; Tourist\_08: tourism orientation of the establishment in 2008; Use\_2019: typology of the establishment in 2019; Tourist\_19: tourism orientation of the establishment in 2019) [See section 2.2. and Table 4]

FID	Shape*	Id	Use 2008	Tourist 08	Use 2019	Tourist 19
0	Point	0	Catering	High	Catering	High
1	Point	0	Closed	Low	Other shops	High
2	Point	0	Catering	Low	Catering	High
3	Point	0	Closed	Low	Catering	Low
4	Point	0	Housing	Low	Housing	Low
5	Point	0	Catering	Low	Catering	High
6	Point	0	Closed	Low	Catering	High
7	Point	0	Catering	Low	Catering	High
8	Point	0	Housing	Low	Housing	Low
9	Point	0	Public services	Low	Public services	Low
10	Point	0	Housing	Low	Housing	Low
11	Point	0	Closed	Low	Museums and art galleries	High
12	Point	0	Housing	Low	Housing	Low
15	Point	0	Private services	Low	Catering	High
16	Point	0	Closed	Low	Housing	Low
17	Point	0	Closed	Low	Fashion	High
18	Point	0	Housing	Low	Housing	Low
19	Point	0	Private services	Low	Fashion	High
20	Point	0	Housing	Low	Housing	Low
21	Point	0	Private services	Low	Closed	Low
22	Point	0	Closed	Low	Other shops	High
23	Point	0	Housing	Low	Housing	Low
24	Point	0	Catering	Low	Catering	High
25	Point	0	Other shops	Low	Closed	Low
26	Point	0	Private services	Low	Private services	Low
27	Point	0	Catering	High	Grocery	Low
28	Point	0	Housing	Low	Housing	Low
29	Point	0	Private services	Low	Catering	High
30	Point	0	Private services	Low	Catering	High
33	Point	0	Housing	Low	Housing	Low
13	Point	0	Private services	Low	Private services	Low
14	Point	0	Other shops	Low	Other shops	Low

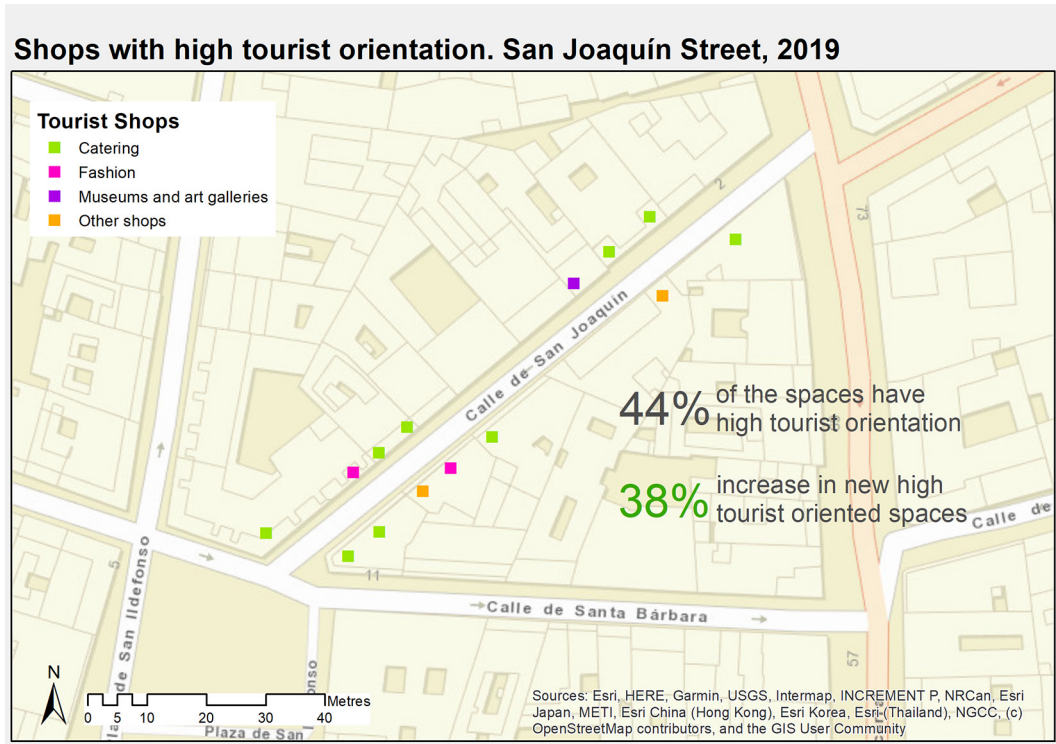
Own elaboration

In a final session, with this database, students must then create maps for the current and the past situations showing only the shops with a high tourism orientation and representing them with different symbols according to their typology. Students should learn how to use the ArcGIS map Layout view. The basic elements of the cartographic representations should appear on these maps: coordinates, legend, scale, orientation, title and authorship (Catalá Romero, 2016). Some text boxes must also be included with descriptive statistical analysis. In the first one, the percentage of shops represented with respect to the total that had been digitalized must be shown in order to provide information on the spatial density of tourism-oriented shops in each study street and for both situations. Then, in the second one, information on the growth of high tourism-oriented shops must be provided in the present situation map, in order to synthesize the trend of the commercial transformation that they have diagnosed by themselves. Figure 5 shows an example of one of the present situation maps.

The cartographic production ends by loading the two maps into the Story Maps application of ArcGIS Online, which allows the creation of a cartographic comparator (example in Figure 6). Students can interactively visualize the evolution of the shops they have digitized, which leads them to actively and significantly access the dynamics of commercial transformation that they have diagnosed.

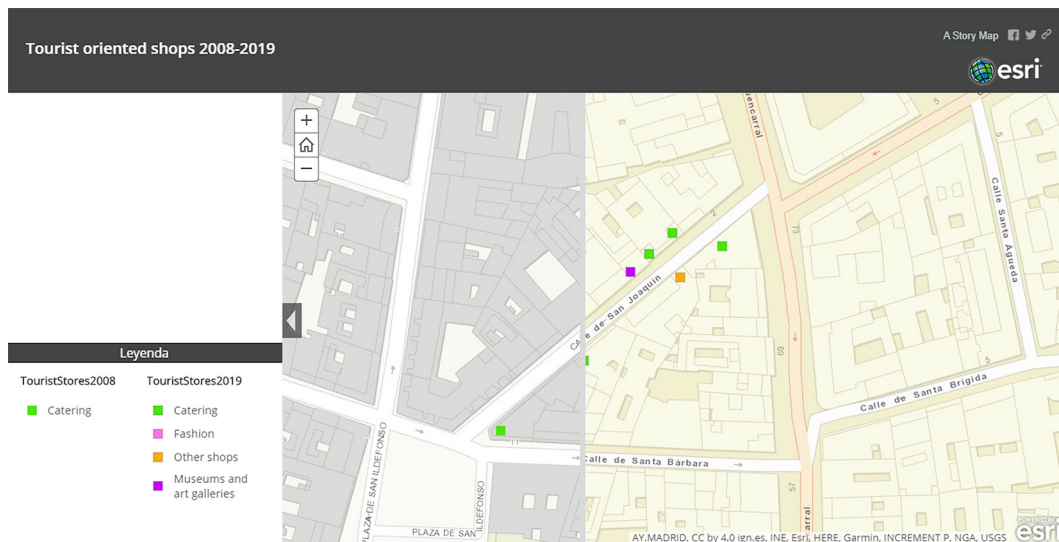


Figure 5. Example of a map layout for the 2019 San Joaquín street tourism-oriented shops, distinguishing typologies and including percentages of their representation over the total number of shops and their growth since 2008.



Own elaboration

Figure 6. Example of a cartographic comparator in ArcGIS Online's Story Maps, with the map of tourism-oriented shops on San Joaquín Street in 2008 (gray image) and 2019 (color image). It is interactively available on <https://arcg.is/0XqLa5>.



Own elaboration

### 3.2.4. Collective idea-sharing

In order to make students aware of the knowledge generated teachers should ask them for a brief oral presentation of their cartographic results, of about 5 minutes. In this oral presentation they will have to make explicit all their learning, channeled through the guiding considerations (see Table 5). Depending on each study street, each group will show examples, either of touristification initiated decades ago or of gentrification by recent touristification, alluding to a diversity of concrete cases. Thus, by putting them

all together, they will have access to all the examples of commercial transformation, in addition to developing skills in oral presentation, case presentation and critical listening. This information highlights the diagnosis they have been able to make of the dynamics of commercial transformation and leads them to ask themselves in what context this happens.

The large group discussion, initiated by the teachers, will redirect the diagnosis of each study street towards the context of the tourism gentrification, making it more comprehensible and committed, through a series of guiding questions on theoretical, procedural and attitudinal contents (see Table 6). In our case, assuming the results of the questionnaire of previous ideas, we would have to insist on the conceptualization of the processes that the students have diagnosed. Having created themselves some maps of commercial transformation dynamics, it will be much easier for them to associate theoretical concepts related to the subject, due to the achievement of a significant learning (Coll, 1988). Likewise, with their participation in the collective idea-sharing task, students will develop communication skills based on argumentation and respect for other interventions.

#### 4. Discussion

The didactic effectiveness of this exercise is based, on the one hand, on the coverage of a series of curricular elements (see section 1.3) and, on the other hand, on the use of GIS as a didactic resource, which in the professional domain can be very useful (see section 1.2.2). In the questionnaires that would have to be passed at the end of the whole activity (validation of previous ideas and didactic satisfaction) we expect positive results, given these considerations on didactic effectiveness.

The use of GIS can be evaluated from a double perspective: firstly, as a didactic tool to achieve learning on a territorial subject; secondly, as a learning object in itself. This teaching practice aims to cover both perspectives. The didactic effectiveness of GIS has already been tested in other works, which coincide in highlighting its importance in increasing motivation (Alcántara Manzanares, Rubio García, & Mora Márquez, 2014), facilitating collaborative and cooperative learning (Vega, 2012) and improving curricular learning (Lázaro Torres, Miguel González, & Morales Yago, 2017), as long as there is hardly no important limitations in its use (Jianya, Yue, Tsehaie, Fuan, & Anjana, 2017), as is the case here. Martínez Hernández, Ibarra Marinas, Pérez Resina, & Figueres Cuesta (2016) found that the use of GIS in the classroom had increased students' interest in the topic. Students appreciated the learning acquired and recognized a more enjoyable and motivating teaching process. Muñoz Solari, Demirci, & Van der Schee (2015) recognize the great usefulness of geoinformation tools in teaching practices. In fact, Arranz López *et al.* (2013, p. 192) state that "the attraction for virtual tools that are usually used outside the academic environment should not be underestimated". This idea is shared by Carbonell-Carrera & Saorín (2017), who verify an increase in student motivation through Street View tools. Moreno Vera (2016) highlights the high value of success in class exercises using web-mapping, which he estimates at 93%. Here we can expect similar results, both qualitatively and quantitatively.

Despite the scarce literature, the didactic effectiveness of GIS in tourism teaching has already been highlighted (see section 1.2.2). Sigala (2012) recognises that the inclusion of GIS in tourism higher education allows students develop two main spatial competences: the use of maps to explore and present information and the creation of their own maps to encourage communication and collaboration. With our teaching design we hope to facilitate both, since students must create and interpret their own maps. Davies (1998) concretizes the didactic value of GIS in the possibility of interacting with different layers of information to make the relationship between spatial variables clearer. Our students will take this possibility with the creation of the cartographic comparator. Chiao, Chen, & Huang (2018) also highlight the importance of the interaction allowed by the Street View tools to improve tourism learning. Molina Torres (2017) adds a consideration concerning specifically heritage: GIS for teaching purposes activates the awareness of conservation. Heritage is certainly involved when studying historic city centers. It is also important to highlight the attitudinal learning that GIS allows in line with STP (Jamal *et al.*, 2011): it facilitates the understanding of unsustainable territorial realities. Stankov, Durdev, Markovic, & Arsenovic (2012) show that tourism students who have used GIS at the university pass their grade with an average value of 4 out of 5. Guyette (2003) stresses that with the use of GIS, tourism students increase their understanding of database management and analysis, as would likely be the case in our teaching proposal when creating and managing the attribute tables of the layers created by the students.

In short, all these results seem to be compatible with the learning expected in the implementation of the activity presented here. The idea already advanced in Martínez-Hernández & Yubero (2020) on the importance of innovative teaching strategies to facilitate the learning of complex contents such as those related to tourism gentrification is maintained. In Table 8 we show a synthesis of the expected learning, beyond the curricular coverage, inspired by the study of the scientific literature and our activity design.

Table 8. Expected learning when performing the activity

Task	Learning		
	Conceptual	Procedural	Attitudinal
Theoretical review by teachers.	Contemporary dynamics of commercial transformation in contexts of tourism gentrification.	-	Experiences of sustainable management in the use of urban space between tourists and residents.
GIS software presentation by teachers.	GIS.	-	-
Add Open Access layer in ArcGIS Desktop.	Open Access geospatial resources.	GIS use: add layer and interact.	Accessibility enhancement with Open Access resources.
Digitalize new point layer.	GIS layer types.	GIS use: create layer, photointerpretation and new objects.	-
Visual analysis using Street View in Google Maps.	Research potential in Google Maps and Street View tool.	Streets localization in Google Maps and “visit” in Street View at different moments using imagery archived.	-
Add new data into the Attribute Table.	Georeferenced database.	GIS use: Attribute Table management.	-
	Shops category.	To visually recognize types of shops.	
	Shops’ tourism orientation.	To interpret shops’ tourism orientation.	
Create maps.	Digital cartography characteristics.	GIS use: digital cartography design.	-
		Make data calculations (absolute/relative).	
Create a cartographic comparator.	Cartographic comparators characteristics.	To use Online GIS: create a Story Map in ArcGIS Online.	-
Oral presentation of the cartographic comparator.	Commercial transformation dynamics in the selected streets.	Elaborate a territorial diagnosis.	-
		To make an oral presentation with cartographic support.	
Large group discussion.	Conceptualization of own diagnosis.	To argument for ideas.	Respect speaking engagements and other opinions.
			Critical thinking: reflecting on the positive and negative aspects of the diagnoses.
			Promoting creativity: devising measures to address the conflict in the sustainable use of urban space between the tourist and residential sectors.

Own elaboration



According to the previous ideas test, 9 out of 10 students knew this study area, what is probably helpful for a better understanding of the abstract component of both a cartography making and the complex phenomenon of commercial transformation. The familiarity of students with Madrid may prove the effectiveness of the selection of this case study, as Pagès has stated: a local approach is usually the first step for understanding global events (2009). However, although the activity has been designed in Madrid, it considers an implementation in other touristified cities. It is replicable when following the same sequenced phases and the requirements in the selection of the study streets (see section 2.2).

## 5. Conclusions

Tourism gentrification, as a complex phenomenon in large urban destinations, is an important topic for future tourism professionals, who must be aware of its characteristics and understand its causes and consequences. To facilitate this cognitive process, innovative teaching strategies, in line with the current paradigm of constructivism (active methodology) and ethical teaching (sustainable tourism pedagogy) are convenient.

In this work, we proposed an activity based on a digital cartography making strategy, in GIS applications such as ArcGIS Desktop and Online and Google Street View. Contemporary dynamics of commercial transformation that are taking place in contexts of tourism gentrification were studied upon selected streets in Madrid.

Being GIS a tool of recognized professional utility in the tourism sector, procedural learning is achieved as much as a conceptual learning. In addition, a final attitudinal learning when confronting the territorial conflict that is diagnosed is also accomplished. Therefore, the adequacy of the didactic activity to the curricular framework is high.

The scientific literature agrees on the didactic effectiveness of GIS, also in tourism studies, but there are no examples concerning the topic of urban transformations and tourism and commercial gentrification in particular, reason why this work contributes to cover that deficiency. In this sense, the use of Google Street View seems to gain a great potential for educational use.

In order to ensure replicability in other touristified cities, a 4-phase methodological design was proposed. The didactic activity is: (i) customizable as there is an initial investigation of previous ideas, curricularly founded, of each specific group of students, as well as the selection of the study streets is adaptable regarding specific criteria; (ii) realisable, as knowledge of the topic is significant and adequate in extension, data, clarity and task sequencing; (iii) collaborative, as students undertake a collective idea-sharing task that respond to a didactically based script, thus providing a basis for sharing the work of each group of students and channelling it towards academic reflection; and (iv) evaluable, as a didactic evaluation questionnaire allows evaluate its effectiveness and, if necessary, improve the activity for future replications.

Likewise, the GIT used in the activity also ensure a resource replicability, independent of having commercial licenses. Google Street View is a free application, as well as the tool of Story Maps from ESRI, which only needs a previous free registration on the website for the simplest tools. It is not the case of ArcGIS, but any free and open access GIS software (QGIS, gvSIG, Kosmo Desktop, OpenJump...) can be used to make the basic cartography we propose. The use of ESRI applications just brings the possibility of going further with the maps and the complexity of the map comparator.

The results shown should be taken with caution because they are not statistically significant, as the activity was interrupted because of class suspension during the global COVID-19 pandemic. Nevertheless, we believe that these partial results can serve as a starting point for further discussion on the didactic strategy and the expected results after full implementation. Firstly, the questionnaire reveals an unexpected lack of conceptualization of the topic. It is thus necessary to improve the theoretical explanations and it might be relevant to ensure further activities that will make learning more explicit. Then, by exhibiting students' digital cartographies, we manage to reduce the abstract component of the activity's approach and contribute to a more realistic perception of it. Finally, it should be noted that the expected evaluation of the activity yields results that coincide with the scientific literature, among which we can highlight: (i) an increase in student motivation, with a dynamic, friendly, challenging and significant interaction; (ii) an improvement in learning in its conceptual, procedural and attitudinal dimensions, in terms of both the content of tourism phenomena and the technology used in the tourism sector; and (iii) the effective

acquisition of spatial and digital skills, which improve students competitiveness of great importance as citizens and as future tourism professionals, since tourism is highly dependent on spatial data updating.

The use of GIS in tourism higher education is therefore appropriate, not only to facilitate the learning of complex territorial phenomena but also to acquire the ability to use a new digital tool that is highly valued in the tourism sector. The activity proposed, based on ArcGIS Desktop and Online applications and Google Street View, serves as an unprecedented example of the implementation of these considerations. We expect further implementation of this activity in order to make a complete quantitative analysis of the knowledge gained by students, taking the final evaluation questionnaire into practice.

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