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Bosphorus is a super-element: mobility culture and urban perception of international students in Istanbul

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ABSTRACT

The purpose of this study is to investigate how international students in Istanbul perceive and practice the city and what role technology plays as a mediator in their mobility culture. Employing a multi-method approach, researchers quantitatively derived a 'funda-mental map' from a mass transit dataset, surveyed 208 international students for persona analysis, and conducted qualitative inquiries including mental maps, in-depth interviews, a diary study, and walk & talk sessions to reveal mobility patterns and challenges. This comprehensive data was comparatively analyzed within the theoretical frameworks of mobility culture, network sociality (drawing on Castells, Simmel, and Wittel), and Lefebvre's theory of the social production of space, alongside Kevin Lynch's legibility analysis of five urban elements. Key findings reveal that students often experience the city within a 'mobility bubble', shaped by their transient social connections and technologically mediated interactions. Furthermore, this two-year study proposes the Bosphorus Strait, a dominant feature in students' urban experience, as a 'super-element' that extends Lynchian typology, critically shaping their perception and navigation of Istanbul.

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International Student Mobility; Mobility Culture; City Image; Urban Experience; Urban Studies; Network Sociality; Public Transport

1. Introduction

Theoretically grounded in urban image, mobility culture, and the social production of space, this two-year collaborative study with the Istanbul Metropolitan Municipality (IBB) investigates how international students experience this intercontinental city. As temporary residents, these students, mediated by mobile technologies, intensively explore Istanbul. This research identifies their prominent personas, examining their urban perceptions, mobility patterns, preferences, and challenges, thereby illuminating the interactions between transient populations and urban settings and enhancing understanding of mobility culture in a metropolitan context.

Cities, as expanding hubs of activity and flow (Jensen 2009), function as intercultural geographies shaped by constant contact and mobility. The interplay between permanent residents and temporary inhabitants generates complex urban dynamics—intensifications, congestions, and new forms of interaction within shared public spaces. These dynamics extend beyond material interactions, constituting socio-spatial practices that require systematic examination through mobility studies' conceptual tools to unpack their multi-scalar complexities. Liminoid

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places, which are sites of encounter and threshold (Vannini 2010), exemplify how mobility creates distinct cultural environments that transcend simple movement. Central to urban mobilities framework, 'mobility culture' emerges as a critical analytic concept, a constellation of symbolic and material practices governing travel behaviors, infrastructure design, and policy discourses (Kuhnimhof and Feige 2013). This concept bridges individual perceptions of the city (e.g. how people navigate and connect to spaces) and broader societal structures. These intersecting dynamics between mobility, perception and space necessitate an analytical approach that bridges urban imaginaries with spatial production.

A multi-layered perspective is thus required, intertwining Lefebvre's ([1974] 1991) production of space with Lynch's (1960) city image. Lynch posits that urban legibility, achieved through a strong city image formed by elements like landmarks, nodes, paths, edges, and districts, is crucial for residents' connection to place. These elements are perceived and shaped by mobilities (Bruns and Chamberlain 2019; Monteiro et al. 2021), and Lynch's work offers a framework for understanding place-making. Lefebvre's spatial triad of perceived, conceived, and lived space contextualizes these urban experiences beyond perception, grounding them in daily mobility patterns and socio-political realities. This interplay of urban mobility, social space production, and city legibility particularly affects temporary residents like international students, whose city engagement, which is more sustained than tourists yet distinct from permanent dwellers, reveals how mobility cultures transform contemporary place-making processes.

Existing literature shows limited comprehensive studies on international students' analog and digital interactions within urban systems, especially concerning technology's role. We argue that mobile technology significantly shapes these students' urban perceptions and experiences, adding novel dimensions to our understanding of their encounters with the city. Thus, our research asks:

RQ1: How do international students in Istanbul perceive and practice the urban landscape?

RQ2: What role do locative media applications play in mediating their mobility culture?

To answer these, our comprehensive mixed-methods study included analyzing a mass transit dataset to create a 'funda-mental map', surveys for persona analysis, mental maps, in-depth interviews, diary studies, and 'walk and talk' sessions. Data was analyzed using Lynch's methods, Lefebvre's social production of space perspective, and the concept of mobility culture.

Mobility, as Cresswell (2010) argues, is a multi-layered social phenomenon encompassing physical displacement, representation, and embodied practice, with its study revealing power relations, spatial domination, and social inequalities. Sheller and Urry (2006) further note that new technologies intensify mobilities, profoundly impacting spaces and diverse mobile populations—from international students to refugees—leading to consequences like cosmopolitanization of local tastes, the concentration of power zones, multicultural enrichment or social exclusion. Complementing this, Castells' (1996) 'network society' concept posits cities as nodes in overlapping economic, symbolic, and digital flows. This global circulation system can create local ruptures, with social interactions increasingly reliant on networked forms of sociality rather than fixed physical spaces. International students, as mobile subjects within these networks, navigate their urban experiences influenced by global imaginaries and spatial narratives.

In experiencing a new city, international students engage with pre-coded urban narratives, global imaginary (Steger 2008) and Lynch's (1960) 'city images', negotiating existing representations and contributing to the reproduction of space. Digital media, especially mobile technologies, are now crucial for understanding this mobile culture, place-making, and urban images (Meenar, Afzalan, and Hajrasouliha 2022; Monteiro et al. 2021; Özkul et al. 2014). Lynch's concepts of imageability and legibility gain new relevance with smartphones and locative media like Google Maps, reshaping urban design discussions and perceptions of cityscapes, particularly among youth who heavily rely on these technologies for communication and identity expression

(Meenar, Afzalan, and Hajrasouliha 2022; Tully and Alfaraz 2017). However, locative media can also reshape urban space use and social practices, potentially reinforcing gentrification, segregation, and consumption patterns (Jansson 2019; Ridell and Zeller 2013; Vuolteenaho, Leurs, and Sumiala 2015).

Research on international student mobility has explored themes like informal place-making (Collins 2010; Prazeres 2018), 'studentification' (Malet Calvo 2018), and socio-cultural adaptation (Beaven 2012; Gebru and Yuksel-Kaptanoglu 2020) or cultural encounters (O'Connor 2020; Robertson 2018). Students often integrate into commercial ventures, influencing urban lifestyles and investment (França et al. 2023; Malet Calvo 2018). Yet, a gap remains in understanding how their physical presence and mobile technology use jointly shape their urban perceptions and mobility culture.

To address RQ1—how students perceive and practice the urban landscape—we drew on studies examining their sense of belonging through residential choices (Prazeres 2018), community interactions (Collins, 2010), and the impact of urban travel, including public transport (Monteiro et al. 2021) and walking (Wilkinson and Badwan 2021). These interconnected cultural practices are intensified by mobile technologies, especially locative media, where the city becomes content, contest, and context.

For RQ2—the mediating role of locative media in their mobility culture—Wittel's (2001) 'network sociality' offers a key theoretical lens. He defines it as sociality that is ephemeral but intense, informational and technological, it combines work and play, it is disembedded and generic, and it emerges in the context of individualization (p. 51). This aptly describes the transient, situational connections characteristic of international students, forming the basis for our investigation into their digitally mediated urban experiences.

2. Research field and methodology

Turkey, ranking seventh globally for international student preference (UNESCO Institute for Statistics 2021), sees Istanbul hosting 118,356 such students in 2024.[1] As a populous global city (18.3% of Turkey's population), Istanbul's transformation into a living space and tourist attraction for foreign communities offers rich insights into how international students perceive and practice its urban image. This necessitates revisiting the city's background to set it as the research field.

Istanbul's urbanization intensified with Western-inspired reforms in the 19th century, fostering cosmopolitan neighborhoods like Galata and Pera (Bozdoğan 2002; Hacihasanoglu and Hacihasanoglu 2006). Economic growth and improved routes led to new, often class-segregated neighborhoods like Nişantaşı and Bosphorus shore settlements (Kurtuluş 2003). By the early 20th century, spatial divisions were clear, but post-WWI, Istanbul lost its capital status and diverse population (Kurtuluş 2003). Following the foundation of the Republic of Turkey in 1923, particularly from the 1930s onward, Istanbul, with its imperial heritage, contrasted with the new capital, Ankara, which became the epicenter of national modernization (Bozdoğan 2002).

Across the second half of the twentieth century, the city was reshaped by state-led redevelopment, land marketization, religious–secular contestation, mass migration, and shifting center–periphery relations, setting the terms on which mobility is organized and perceived. Internal migration tied to mid-century industrialization drove rapid expansion, informal settlements, and housing shortages, deepening hierarchies along the core–periphery axis and leaving durable exclusions in access to services and centrality (Bartu Candan and Kolluoğlu 2008; Buğra 1998; Keyder 2005; Kıray 1998; Kurtuluş 2003; Tuğal 2021). These dynamics were intensified by the 2010s arrival of large refugee populations; Istanbul alone hosted more than 500,000 registered Syrians under temporary protection by 2016, with consequences for where temporary residents live and how they traverse the city (Rottmann and Kaya 2021).

From the 1980s, neoliberal redevelopment reinforced selective centrality through property-led renewal, branded precincts, and waterfront projects, often at the cost of dispossession

(Enlil and Dinçer 2022; Karaman 2013), a pattern scholars term 'bulldozer neoliberalism' (Lovering and Türkmen 2011). Time–space compression along metro, metrobus, and Marmaray corridors made high-value districts more reachable while many peripheral areas remained slow and fragmented, conditions later visible as a mobility bubble. Governance cycles of decentralization and recentralization concentrated national influence over metropolitan policy and finance, shaping transit provision, nighttime mobility, and redevelopment priorities amid partisan conflict (İkizer 2022; Şevkin and Gül 2025). Mega-projects such as Kanal Istanbul, large-scale infrastructure, and consumption-oriented cultural venues further advanced a world-city orientation and a transformed built form of high-rises, luxury amenities, and new festivals by the mid-2000s (Bartu Candan and Kolluoğlu 2008; Doğan and Stupar 2017; Keyder 2005; Öncü 1997).

Public culture and contention have continually recalibrated how districts are performed and perceived. Struggles over visibility, norms, and acceptable uses of space code places as comfortable, authentic, or off-limits for newcomers (Gökarıksel and Secor 2015; Secor 2001). Episodes such as the 2013 Gezi protests reasserted claims to public space and democratic participation in planning, leaving repertoires of action and urban imaginaries that circulate through the same digital platforms students use to discover and evaluate places (Abbas and Yigit 2015; Houston 2022).

Across these mechanisms, platforms may translate planning and market logics into everyday legibility: default routes and popularity rankings seem to amplify corridorized centrality and boost consumption zones, while rendering low-ranked peripheries less visible. For international students, this yields a city that is highly imageable yet selectively so. Our analysis leverages this context to explain why a bounded 'mobility bubble' emerges and how students, through their urban user experience, participate in the ongoing production of Istanbul. These mechanisms inform our operationalization of conceived space and motivate our focus on corridor and waterfront effects.

As a transnational hub in the 2020s, Istanbul attracts tourists and skilled migrants, drawn by global job opportunities and its East-West cultural blend (Erginli and Baycan 2025; Tuncer 2024). Expatriate settlement, post-Covid tourism, and 'Airbnbzation' have worsened the housing crisis (Tuncer 2024), especially in central, historical districts like Beşiktaş, Şişli, Bakırköy and Kadıköy, driven by urban renewal and speculation. These areas, favored by transnational migrants and upper-income groups (Gündüz et al. 2025; Istanbul Planning Agency 2021; Tuncer 2024), remain vital for transport and social interaction. Conversely, peripheral districts like Esenyurt, Kağıthane, Sultanbeyli, Sancaktepe inhabited by low-income and migrant communities, are reconfigured by state-corporate alliances with gated communities, squeezing existing low-income neighborhoods (Bartu Candan and Kolluoğlu 2008; Istanbul Planning Agency 2022).

Istanbul's universities cluster centrally (Kadıköy, Beşiktaş, Fatih) while expanding to peripheries (Esenyurt, Büyükçekmece, Bağcılar), according to Turkey's Council of Higher Education (Yükseköğretim Kurulu 2022). For international students,[2] this spatial distribution generates distinctive mobility patterns. Their residential choices, transportation behaviors, and social hub preferences reflect broader urban spatial practices while revealing how they navigate and experience Istanbul's multi-layered urban fabric alongside expat and migrant communities. Their hybrid tourist-resident identities transform Istanbul into a dynamic space of exploration and discovery, providing valuable perspectives on its evolving urban culture and image.

Mobility is simultaneously movement, representation, and embodied practice (Cresswell 2010). Sheller and Urry (2006) note how techno-mediated mobilities reorganize socialities and spatial inequalities, a point that resonates in Istanbul's network society position (Castells 1996). We extend this by specifying mechanisms through which Istanbul's post-1980 restructuring intersects with mobility culture: (1) selective centrality via metro/metrobus/Marmaray corridors that compress time–space between high-value districts; (2) waterfront consumption-scapes where cruise terminals, malls, museums, and branded public spaces reformat access and imageability;

(3) short-term rentalization and studentification pressures that shift residential options and rhythms; and (4) platform governance that ranks, routes, and renders places visible or invisible.

To systematically capture these mobility patterns, our research unfolded in phases. *Phase 1* involved analyzing a 30GB IBB dataset of over 265 million Istanbulkart journeys by foreigners (September 2021–September 2022) using Python libraries and Tableau. This analysis formulated a 'fundamental map' of frequented stations/lines, delineating nodes, districts, paths, and edges, focusing on student versus non-student patterns. Landmarks were identified by amalgamating offline (tourist/travel guides) and online sources (e.g. OpenStreetMap, travel websites, search engines) to complete the 'fundamental map'.

In *Phase 2*, we developed personas to structure and interpret recurring patterns in students' urban experiences. Grounded in human-computer interaction and cultural studies, a persona is a research-informed, fictional profile that represents a specific user group's behaviors, motivations, and goals, enabling a deeper analysis of subjective and digital practices (Bounegru, Devries, and Weltevrede 2022; Marshall, Moore, and Barbour 2015). To construct these personas, we first distributed a custom-designed 28-question online survey to 208 international students, analyzing 178 complete responses. We then applied a hybrid quantitative model: a principal component analysis (PCA) reduced the data's dimensionality, after which K-means clustering identified three distinct persona groups based on shared traits (Almahri, Bell, and Arzoky 2019; Anaraki, Haeri, and Moslehi 2021). Finally, these data-driven profiles were validated and enriched through in-depth interviews with representative students from each cluster, ensuring the personas accurately reflected the lived experiences within Istanbul's international student population.

Phase 3 involved 15 Erasmus students drawing mental maps of Istanbul and their neighborhoods using Lynch's method (five elements). Five group sessions and exit interviews provided deeper insights into their needs, expectations, locative media use, and persona alignment (Figure 1).

Given that Google Maps was identified as the primary locative media used by students, we focused on its mediating role. A novel gamified digital diary study, 'Istanbul Incognita', was conducted (April–May 2022) with 12 participants self-reporting routines via WhatsApp for two weeks through game-like 'quests' designed to assess urban experiences (Figure 2).

The research culminated in 'walk and talk' sessions with four Erasmus students, following their daily routes for one hour while they used their preferred locative media (Figure 3). These ethnographic walks, with exit interviews and final mental maps, enriched persona analysis. Our final analysis depicted international students' urban experience via three personas.

We conceptualize international students' urban experience at the junction of three strands: Lynch's imageability/legibility of urban form, Lefebvre's production of space, and the mobilities paradigm. Rather than citing these in parallel, we use Lefebvre's triad (perceived, conceived, lived space) as the analytic scaffold for both data collection and interpretation. In our design, perceived space corresponds to observable mobilities and infrastructural affordances captured via the Istanbulkart dataset and the resulting fundamental map; conceived space refers to planning logics, policy imaginaries, and platform algorithms that script movement and visibility; lived space is elicited through personas, mental maps, diaries, and walk-and-talks, where meaning, attachment, and tactics are articulated.

Within this frame, Lynch's elements are treated as outcomes of infrastructures and platforms that privilege particular connectors and sites. The triad then guides our questions: which conceived abstractions are being inscribed in perceived space, and how do lived tactics qualify or contest those inscriptions? Extending prior work on international students, we specify how algorithmic curation and infrastructural tunneling co-produce a bounded field of action (Graham and Marvin 2001), shaping what becomes legible and accessible in everyday practice.

Empirically, we document a tightly bounded mobility bubble concentrating student movement within a small central triangle. Theoretically, we (i) provide evidence consistent with the idea

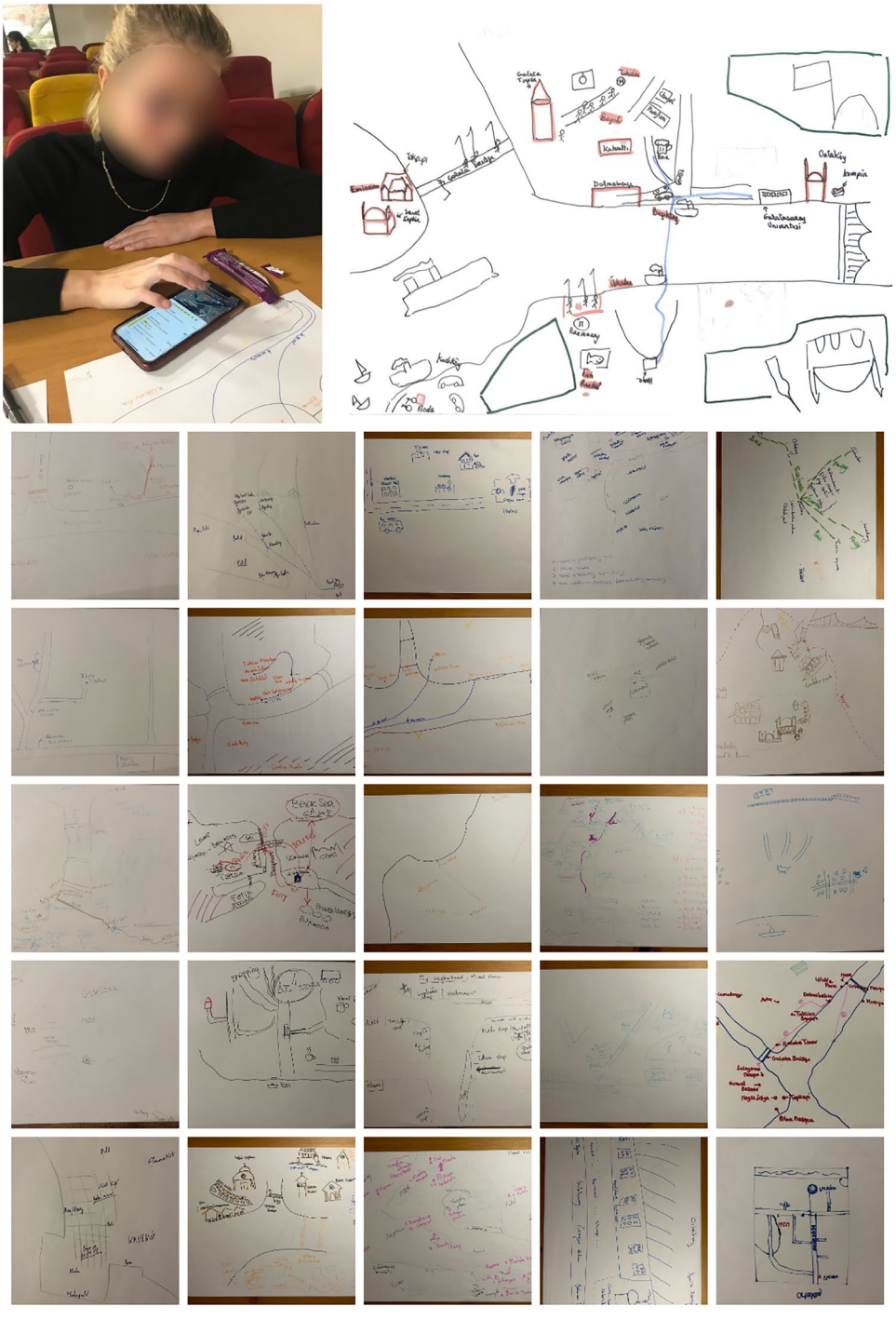


Figure 1. Map sketching sessions. *Note*. Top left: photograph from a sketch-mapping session (participant face blurred). Top right: a hand-drawn participant map. Bottom: collage of mental maps produced by international students.

that routing and ranking defaults may operationalize conceived space and channel perceived space; (ii) identify the Bosphorus as a super-element that organizes orientation across all five of Lynch's elements; and (iii) illustrate how students make Istanbul through platform-mediated



Figure 2. Diary study with gamification. *Note*. International students were invited to participate in the Istanbul Incognita social research game through posters and other communication material distributed in university campuses (left). Participants received achievements upon completing each quest, represented by virtual badges of honor and meme-like graphics that present interesting facts about Istanbul's history, culture and landmarks (right).

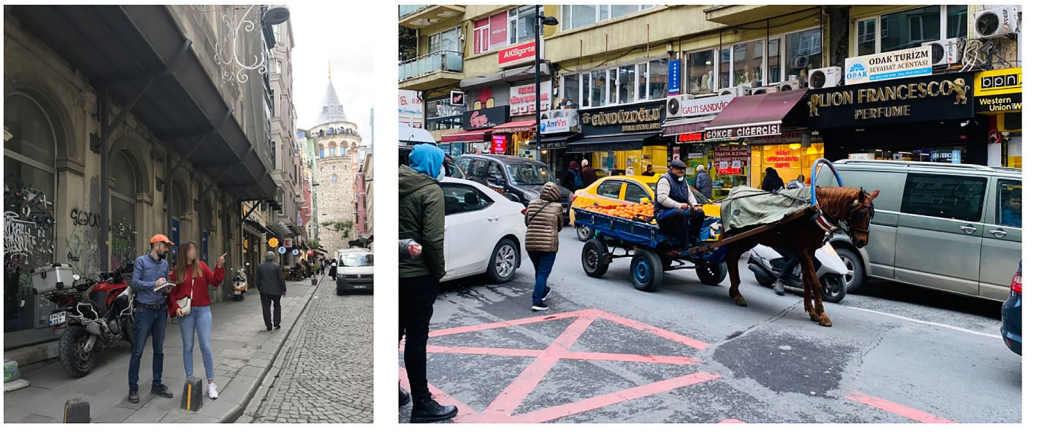


Figure 3. Walk and talk session. *Note*. Researchers accompanied participants as they shared their experiences and observations during the walk and talk session in the city (left). Participants also shared the images that they captured throughout the digital diary phase (right).

contributions (reviews, images, and repeat patronage) that signal demand and feed back into central consumption geographies.

To orient readers to Istanbul's complex urban geography, Supplementary Appendix A provides an analytical description of the study's key districts and neighborhoods, alongside a link to an interactive map.

3. Results

3.1. Fundamental map of Istanbul

Analysis of IBB's mass transit dataset (25,627 stations; modes including metro, bus, ferry) compared student and non-student foreign traveler usage (Figure 4(a)). Detailed map (Figure 4(b))

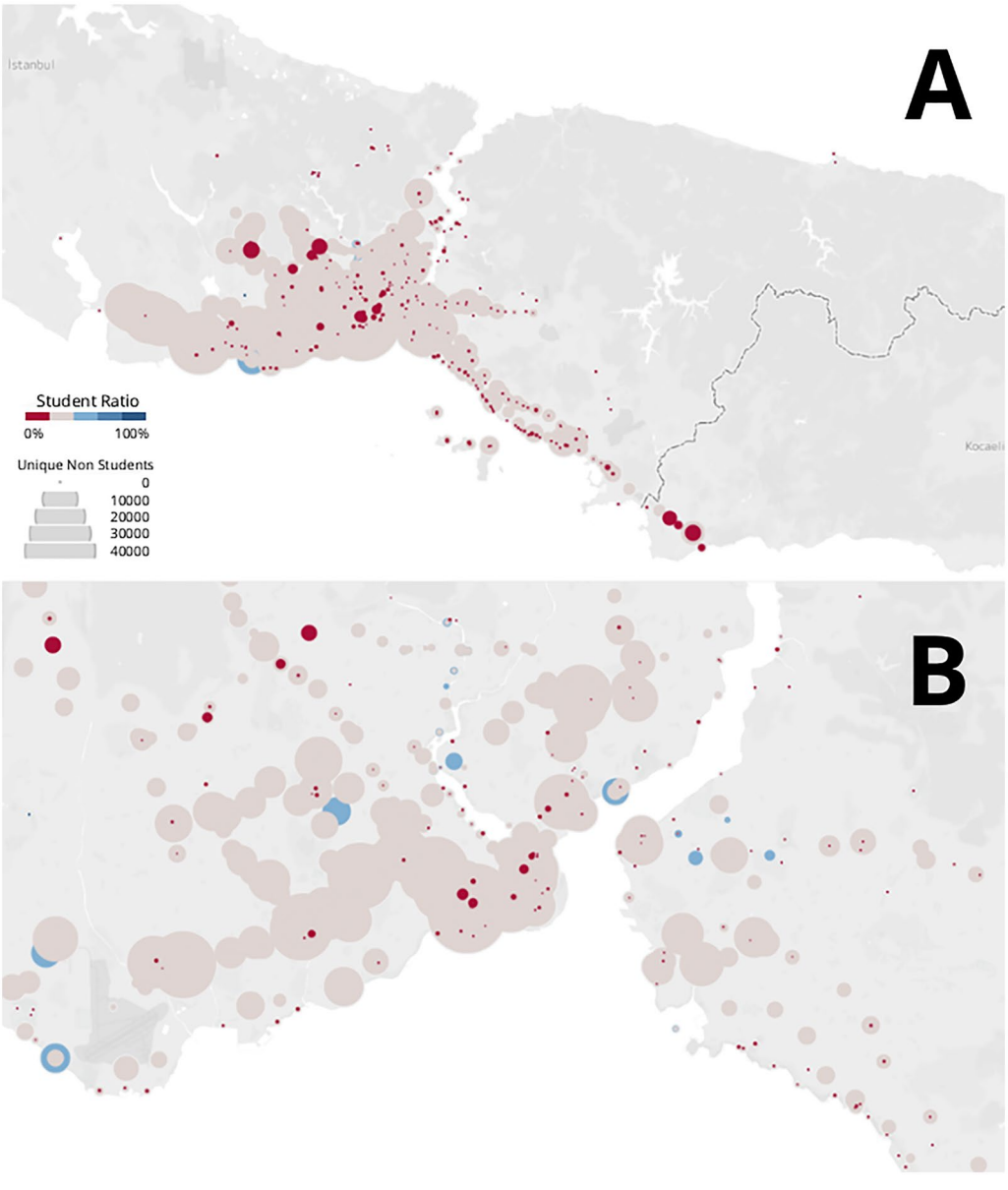


Figure 4. Bubble map for student ratio at mass transit stations in Istanbul. *Note*. Overview (A) and detailed view (B) of Istanbul's mass transit dataset are shown. Bubble size corresponds to non-student visits per station, peaking at 44,033 in Aksaray tram station. Blue hues denote student presence, ranging from 12.5 to 34.8% at stations with at least 1,000 visits monthly.

revealed higher student numbers and ratios in transport hubs and university areas, including Beşiktaş, Halıcıoğlu, Beşyol, northern Golden Horn, and parts of Üsküdar (Fıstıkağacı, Bağlarbaşı).

Heatmaps (Figure 5), clustering spatial data to prevent overlap, corroborated higher student usage in Beşiktaş, Üsküdar, and the northern Golden Horn, despite generally similar overall mobility patterns.

Absolute usage numbers (Figure 6) showed students predominantly using the metrobus line from western Istanbul (Beylikdüzü) towards city centers. At Yenikapı/Aksaray (Old City), paths diverged: one across the Bosphorus to Üsküdar/Kadıköy (metro-ferry hub), the other across the Golden Horn to Taksim/Beşiktaş.

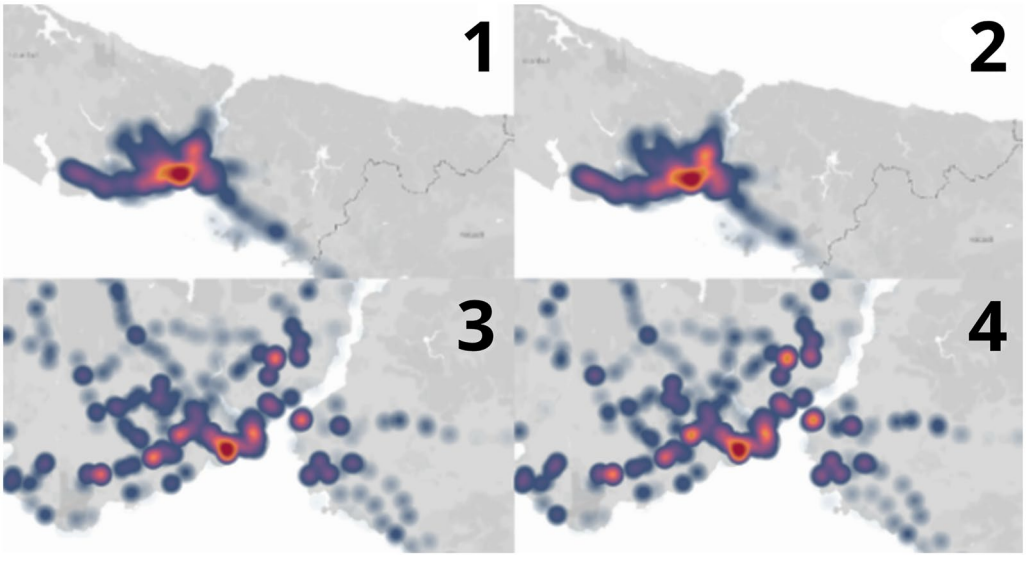


Figure 5. Heatmap for student ratio at mass transit stations in Istanbul. *Note*. The heatmaps in the first row illustrates non-student (1) and student (2) usage of public transport stations in Istanbul. The second row of maps focuses on the city centers, depicting non-students' (3) and students' (4) usage. Subtle differences can be observed with this method.

To manage data density (over 30 stations/2 km^2 in some areas), stations <1,000 m apart were clustered (Figure 7). This clustering revealed a primary west-east student route to the Old City, with extensions across the Bosphorus. However, the northern Bosphorus shores beyond Üsküdar and the eastern Marmara shores past Kadıköy saw infrequent student visits. Notably, students appeared to avoid Bakırköy and Bahçelievler, which are heavily frequented by non-student populations.

While this dataset shows student numbers and proportions, it doesn't explain motives. Initial inferences suggest commutes (home-university, transit hubs) are primary drivers, with amenity visits explored later. From this data, we constructed Istanbul's fundamental map using Lynch's framework. The fundamental map (Figure 8) strikingly shows nodes, landmarks, and paths concentrated within a < 50 km^2 triangle in Istanbul (total area 5,461 km^2). Students primarily navigate three districts within this confined space, hosting <10% of Istanbul's population. The main metrobus line links western Istanbul to the Bosphorus's Asian shores; Marmaray railway connects to inner-city metros at Yenikapı. Key student nodes include Yenikapı, Taksim, Aksaray, Üsküdar-Kadıköy, and Beşyol-Şirinevler.

Distinct districts (identified by color in Figure 8) are: *Yellow* (Beyoğlu, Şişli, Beşiktaş, parts of Kağıthane) featuring Galata Tower, Taksim Monument, Dolmabahçe Palace, Bosphorus Bridge, Ortaköy Mosque; *Pink* (Fatih/Old City) with Hagia Sophia, Sultanahmet Mosque, Topkapı Palace, Süleymaniye Mosque; and *Green* (Üsküdar/Kadıköy shores) with Maiden's Tower, Beylerbeyi Palace.[4]

Vast areas (purple on map)—northern Bosphorus, western inner-city neighborhoods, eastern Marmara shores—remain largely unexplored by students. This concentration aligns with a disconnected, **'tunneled'** mobile culture. It mirrors Graham and Marvin's (1996, pp. 58–60) 'tunnel effects', where infrastructure prioritizes central, high-value areas while bypassing peripheries. Istanbul's transit networks (Marmaray, metrobus, metro) reinforce this dynamic, with major lines like Yenikapı-Levent and Şirinevler-Şişli-Zincirlikuyu creating rapid corridors between landmarks, tourist sites, and affluent districts, while vast areas—such as the northern Bosphorus, western inner-city neighborhoods, and eastern Marmara shores—remain largely unexplored, effectively *terra incognita* in students' spatial practices. This infrastructural conditioning shapes international students' urban perceptions, compelling concentrated interaction with select regions while structurally excluding

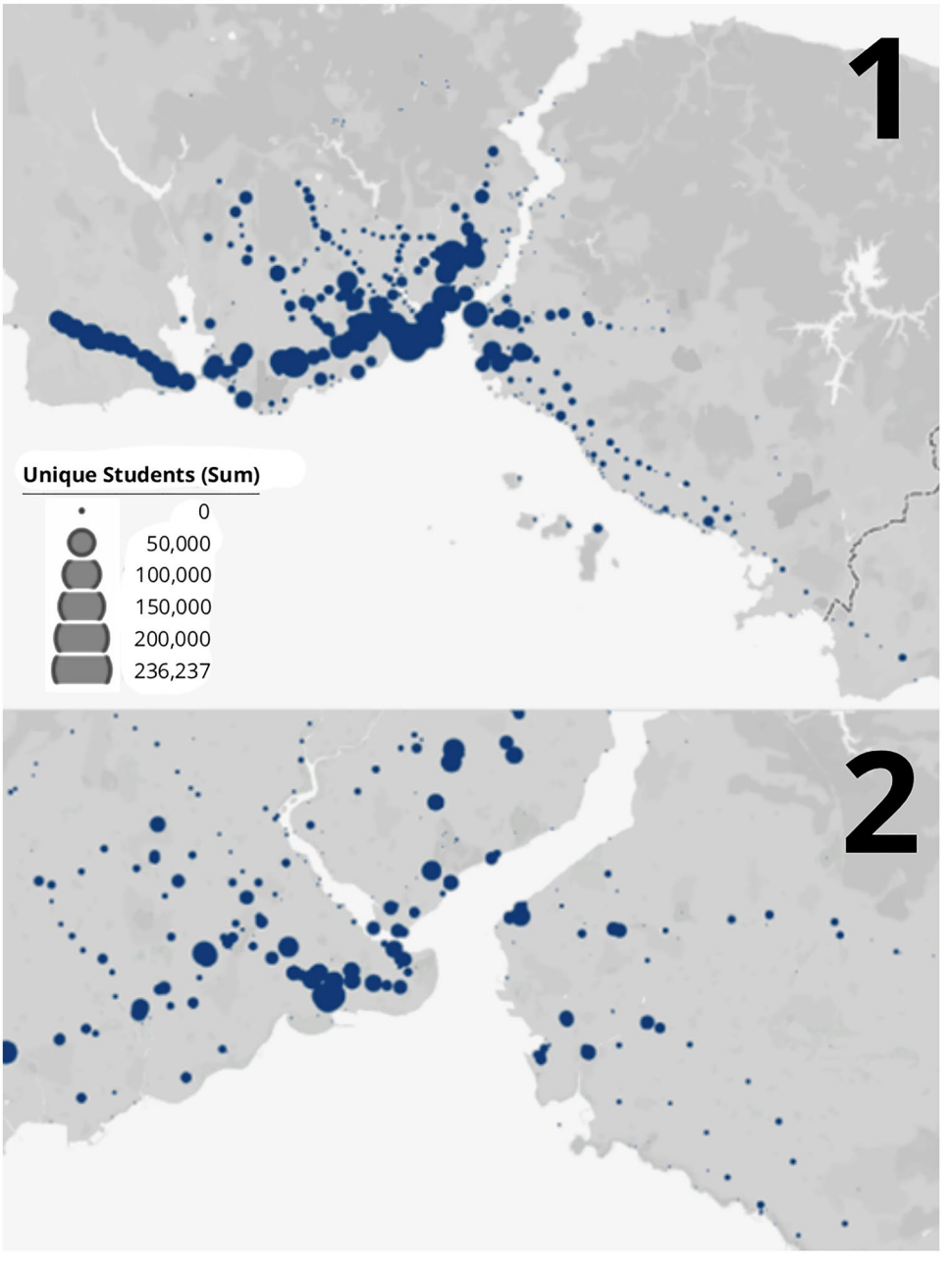


Figure 6. Number of students using mass transit stations in Istanbul's centrum. *Note*. A general map (1) and a detailed view focusing on the city centers (2), illustrating the absolute number of students using public transportation.

others. The resulting 'fundamental map' not only highlights Istanbul's two natural edges (the seas and the Bosphorus) as boundaries but also underscores how transit systems enforce a cognitive dichotomy between high-engagement zones and bypassed territories, privileging connectivity to historical centers and higher-income districts over peripheral exploration.

This leads to refined research questions: In a metropolis confining student mobility to such a narrow, bounded space, how do temporary foreign residents perceive and experience Istanbul daily, and how do locative media mediate this?

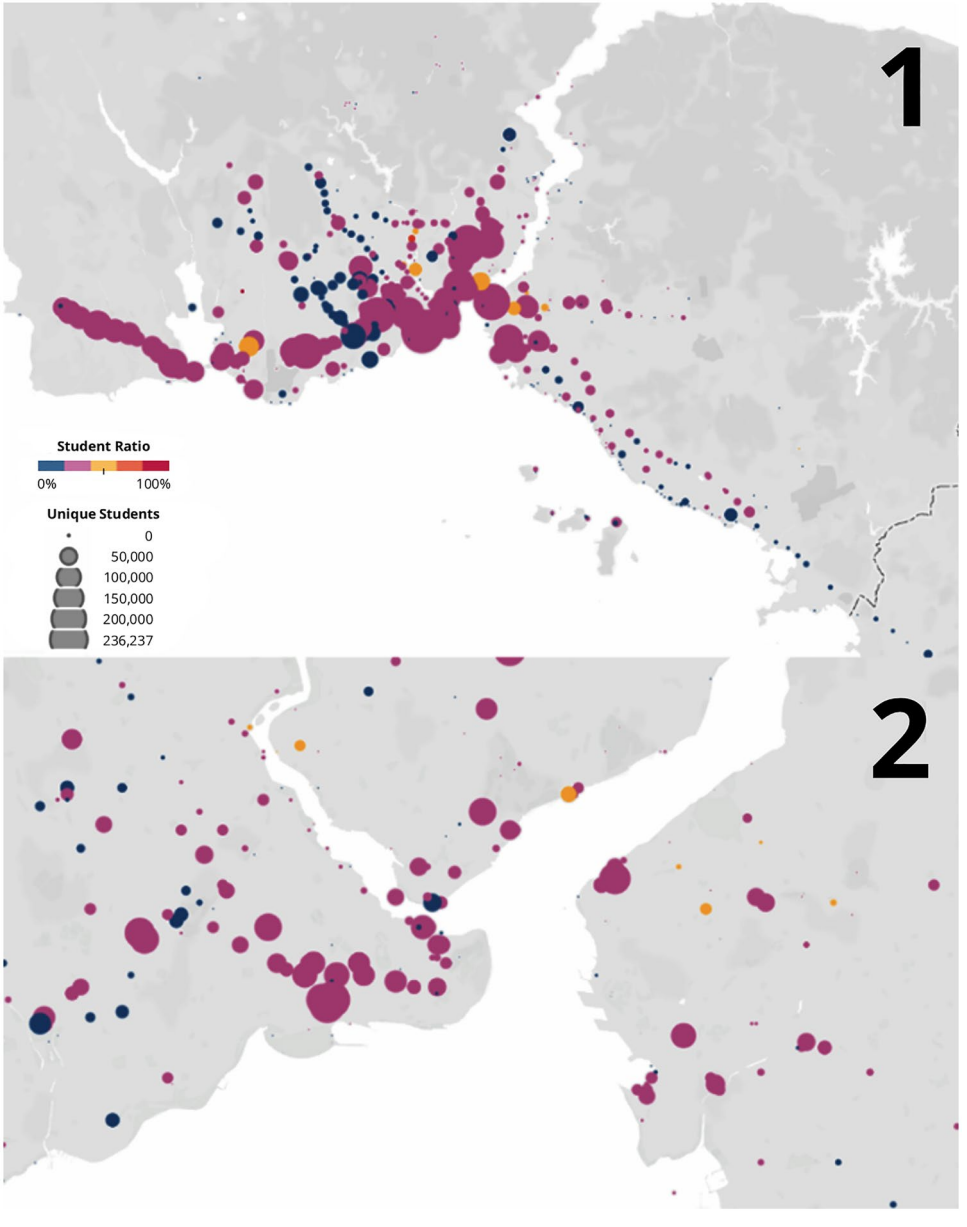


Figure 7. Clustered map for student ratio and numbers for mass transit stations in Istanbul. *Note*. A general map (1) and a detailed view focusing on the city centers (2), depicting both the student ratios and the absolute number of unique students using public transport stations. Stations are clustered together if they are within a proximity of 1,000 meters, resulting in 514 the most popular locations.[3]

3.2. Erasmus student personas in Istanbul

Our analysis of the survey data using K-means clustering revealed three distinct personas among Istanbul's international students (Figure 9). These groups—the *Spontaneous Explorer*, the *Well-Planned History Connoisseur*, and the *Social Connector*—exhibit unique characteristics related to their urban mobility, technology use, and social patterns. The profiles for each persona are detailed below (Table 1), incorporating demographics, motivations, and frustrations drawn from both the survey data and the follow-up interviews.

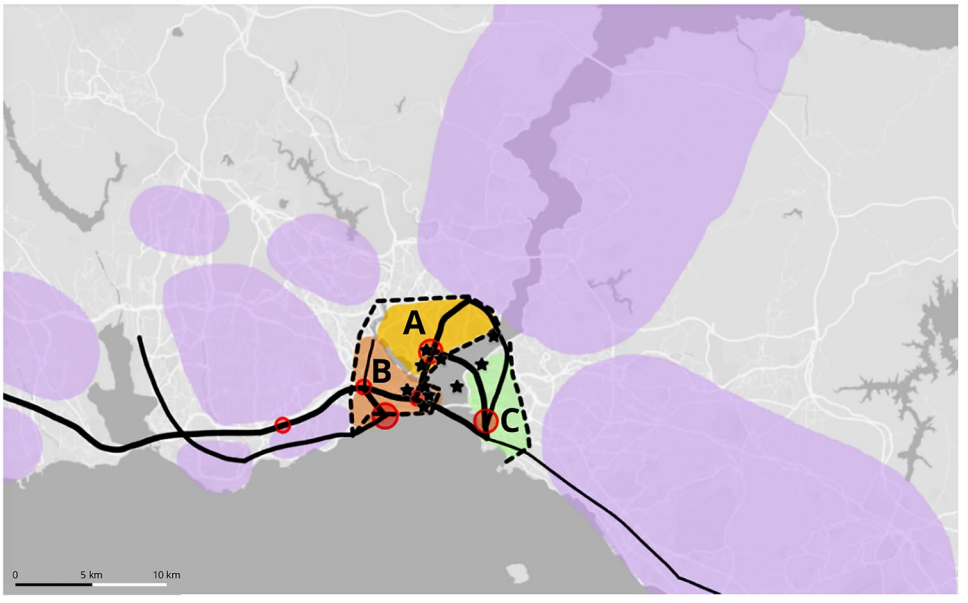


Figure 8. Istanbul's fundamental map derived from data on international students. *Note*. The funda-mental map of Istanbul's international students, derived from public transport data, includes the five elements of the city: lines denote paths, dashed lines represent edges, stars indicate landmarks, colorful areas signify districts, and red circles mark nodes.

3.3. Istanbul as a mobility hub: international students' impressions and experiences

Lynch (1960) defines paths as channels of movement. Mobile map users often struggle with complex paths, highlighting needs for urban legibility (Ahmadpoor and Smith 2020). In Istanbul, participants' accounts show a complex mobility culture influenced by varied paths and transport systems, differing across personas. Surveys indicated strong reliance on public transport (bus, metro), with ferries popular for practicality and Bosphorus views. However, traffic congestion and perceived bus unreliability led many to walk, showing adaptability amidst mobility challenges. Representative quotes illustrate preferences:

> [I prefer] walking because I hate all other modes of transport in Istanbul except the ferry which is amazing. But I also use the bus when I don't have other choices.

> I always go in Bebek and to Beşiktaş. And if I want to go, you know, some further, so it's from Besiktas that if I want to go to like the Asian side, so I will take ferry.

> Mostly I use the bus to come to the university because there is no other transport to the university.

Nodes, often path intersections (Lynch 1960), confirmed from the funda-mental map included transit hubs plus key ferry stops (Karaköy, Beşiktaş, Kadıköy). The Bosphorus itself acts significantly beyond paths and nodes, encompassing ferry routes, port connections, and landmarks like the bridges, used occasionally via bus/metrobus/dolmuş for intercontinental travel. The funda-mental map's three core districts contrast with vaguely perceived outer areas ('Far Far' northwest, 'Nice Forests' northeast, 'Nice Islands' south) lacking strong character or known paths/landmarks for students. Familiar districts, however, feature intersecting paths and nodes around prominent landmarks: Galataport, historic mosques (Ortaköy), palaces (Dolmabahçe), prominent structures (a gigantic flagpole in Çamlıca), statues (the Kadıköy bull, the Beşiktaş eagle), cultural hubs (Istanbul Modern), and personal spots (e.g. 'beer place'). While edges delineate districts, the Bosphorus consistently emerges as the predominant feature across paths, nodes, and landmarks, frequently referenced in interviews and diaries for its multifaceted significance (Table 2).

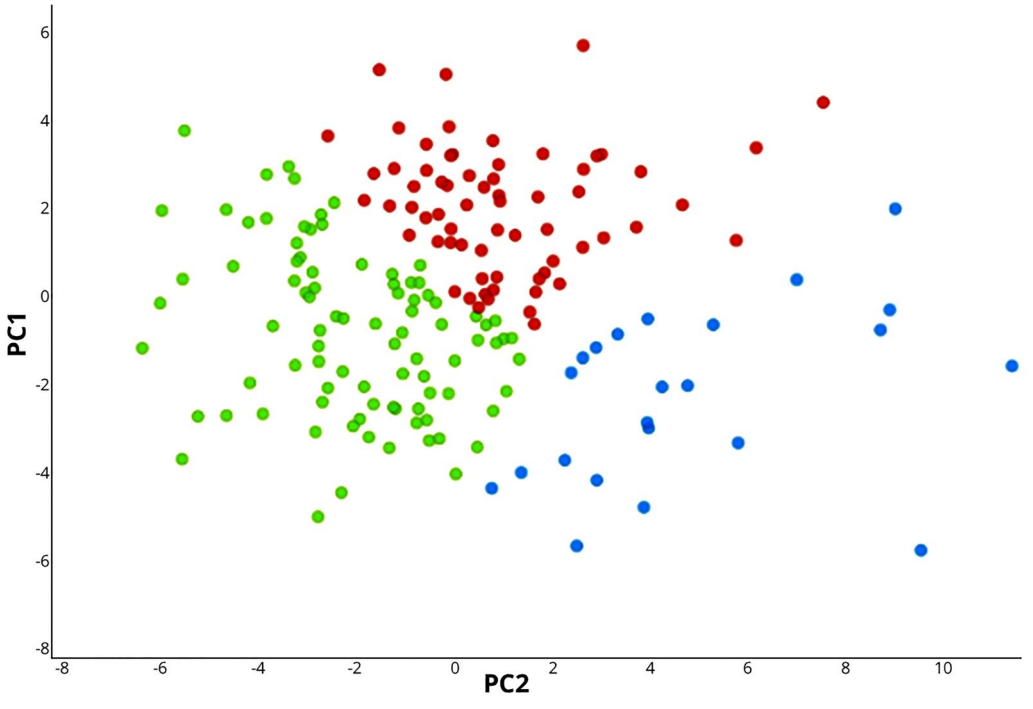


Figure 9. K-means clustering of international student survey responses post-PCA. *Note*. The three clusters – C1 (Blue), C2 (Red), and C3 (Green) – were identified with the K-means method following PCA, visualizing distinct personas of international students, based on their survey responses.

Breaking down the aggregated mental image by persona (Figure 10) provides nuance beyond Big Data generalizations, incorporating walking experiences and social contacts.

The *Spontaneous Explorer*'s map is expansive, reaching Black Sea suburbs (Şile, Kilyos), Riva-Beykoz, Belgrad Forest, and Princes' Isles. They subdivide inner-city districts (e.g. Balat; distinct Galata-Şişli areas; Kadıköy/Üsküdar/Kuzguncuk) and identify lesser-known landmarks (Yoros Castle, Aqueduct), often using niche locative platforms (Spotted by Locals, blogs) alongside walking. The *Well-Planned History Connoisseur*'s map is zoomed-in, confined to the three main districts. Their perception centers on a multimodal path (home-ferry-metro-walking) connecting Beşiktaş, Üsküdar, and the Old City, referencing historical landmarks (mosques, churches). They heavily rely on Google Maps for planning, even abandoning trips based on review quantity (e.g. the Anastasian Wall). The *Social Connector*'s map is long and narrow, detailed on the European side up to Sarıyer via the Taksim-Levent metro. Southern districts are broadly defined. Their map highlights social/entertainment spots (Galatasaray High School, Parkorman, İstinye Park), especially in upscale northern neighborhoods. Their use of locative media is socially oriented (e.g. using Foursquare remnants to find friends/venues).

Adjective analysis reveals a strong, generally positive, yet contradictory image of Istanbul. Frequent terms include 'huge/big', 'crowded', 'exciting', 'beautiful', 'chaotic', 'cosmopolitan', 'noisy', 'unique', and 'polluted', as well as 'amazing'. Unique mentions include 'dynamic', 'alive', 'full of life', 'welcoming', and 'melancholic'. This duality (unique/beautiful vs. chaotic/polluted) reflects the aesthetic contradictions of neoliberal cities (Walks 2006; Zukin 2009), evident even in temporary student experiences. Perceptions are permeated by Istanbul's historical layers, encompassing its Ottoman heritage, Republican reforms, migration, and neoliberal interventions. Personas showed similar overall perceptions, often contrasting Istanbul with their smaller, quieter hometowns (Table 3).

Table 1. Profiles of three distinct international student personas.

Attribute	The spontaneous explorer	The well-planned history connoisseur	The social connector
Age	21	23	22
Gender	Female	Female	Male
Country of origin	Germany	France	Italy
Residence	Kadıköy	Beşiktaş	Galata
Key characteristics	Prioritizes spontaneously exploring the city and its surroundings by usually walking. Seeks authentic experiences and off-the-beaten-path attractions. Values communication with locals and participation in cultural activities.	Values organization, preparation, and practicality. Prefers public transport. Prioritizes efficient wayfinding, access to information, and clear communication. Seeks structure, guidance, and support in navigating the study abroad experience.	Highly social and outgoing, prioritizing connections and social interactions. Values opportunities for social integration, leisure options, and cultural exchange. Seeks a sense of community, belonging, and vibrant urban atmosphere.
Expectations	Expects to discover unique aspects of Istanbul's culture and nature. Anticipates forming meaningful connections with locals and fellow students. Hopes to encounter hidden gems and lesser-known attractions off the tourist path.	Expects to receive clear and comprehensive information about logistics and public transport. Anticipates structured support for navigating university procedures and city life. Hopes for efficient wayfinding tools and guidance to ease the transition to a new environment.	Expects to find a vibrant social scene with opportunities for networking and friendship. Anticipates engaging social activities, events, and nightlife options in Istanbul. Hopes for a welcoming and inclusive community of fellow students and locals.
Frustrations	The difficulty of navigating unfamiliar areas and language barriers. Disappointed when unable to find authentic urban experiences or genuine interactions. Upset by overcrowded tourist-centric experiences and the public transport.	The lack of accessible information or resources for practical needs. Overwhelmed by bureaucratic processes or unclear university procedures. Stressed by the complexity of navigating a new city without adequate support.	The difficulty in finding like-minded individuals or social groups. Disappointed by limited opportunities for social interaction outside of organized events. Feeling isolated or lonely due to challenges in connecting with others or cultural differences.
Motivations	Motivated by the desire to broaden cultural horizons and gain new perspectives. Inspired by the opportunity to document and share unique experiences with others. Driven by a sense of curiosity and adventure to uncover the secrets of Istanbul.	Inspired by the opportunity to challenge herself and adapt to new environments. Driven by a sense of purpose to succeed academically and professionally during their time abroad.	Motivated by the opportunity to expand social networks and form meaningful relationships. Inspired by the prospect of experiencing diverse cultures and perspectives. Driven by a desire for personal growth, self-discovery, and memorable experiences during their time in Istanbul.
Key preferences	Cultural heritage and natural reserves	Historical landmarks and districts	Music and entertainment hubs, modern lifestyle
Locative app	Spotted by Locals	Google Maps	Foursquare
Social media app	YouTube	Twitter (X)	Instagram
Summarizing quote	'I'm discovering the city just by walking and getting lost in the streets. These places i talked about are really beautiful and authentic'.	'I have done some research about the things to visit, and I explore the city'.	'I loved everything - nightlife, culture, food… I was disappointed about the closure of alternative music bars and the fact that many famous bands are leaving'.

Note. The descriptions for the three personas; the spontaneous explorer, the well-planned history connoisseur, and the social connector.

Table 2. Participant perspectives on the elemental role of bosphorus.

Referred element	Participant's remark
As path	'The Bosphorus and the way it is used as a common road. When living on the European side, going to the Asian side is quite distinctive as it is much calmer and more different'.
As edge	'I need to cross the Bosphorus everyday to go from home to the school'.
As district	'To me, Bosphorus is the area with the most distinct feeling. It is "breath"'.
As node	'With all the ports, like the one in Beşiktaş that I use every day, and many connection options, the Bosphorus itself is like a transit hub'.
As landmark	'I knew the Maiden Tower, the Bosphorus Sea, and symbolic buildings as Ottoman mosques [as the symbols of the city, before coming to Istanbul]'.

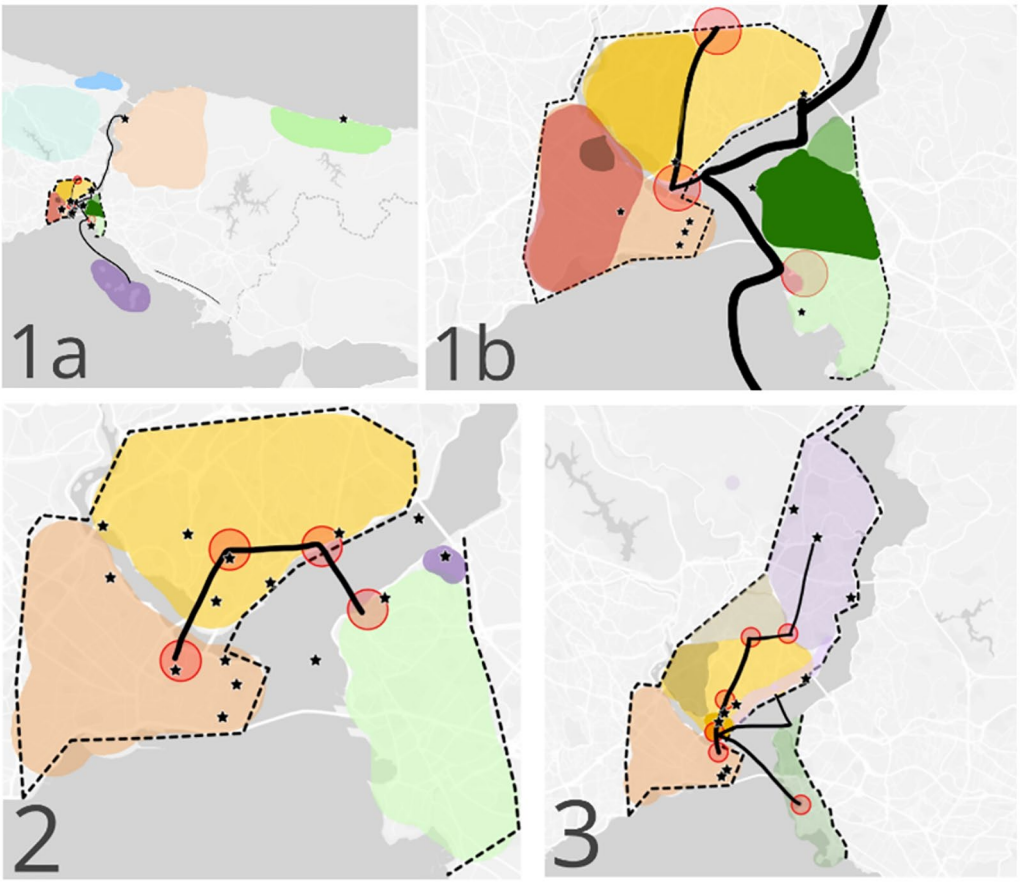


Figure 10. Mental maps of Istanbul from three student personas. *Note.* The mental maps of Istanbul, derived from the inputs of three student personas, include: the *Spontaneous Explorer*'s broader map (1a) and a detailed map focused on the three main districts, subdivided into micro-districts by them (1b). These are followed by the *Well-Planned History Connoisseur*'s map (2) and the *Social Connector*'s map (3).

4. Discussion

This section interprets our findings through network sociality and Lefebvre's triad to explain why international students experience a persistent mobility bubble in Istanbul. We show how platform logics and infrastructure channel newcomers into dense central circuits, standardizing discovery while still enabling digital placemaking. The three personas illuminate distinct modes of uptake: the *Well-Planned History Connoisseur* aligns closely with platform defaults, the *Social Connector* co-produces visibility through repeated patronage and sharing, and the *Spontaneous*

Table 3. Adjectives used by a spontaneous explorer to describe home and host cities.

City	Adjectives
Istanbul	Very big, amazing, friendly people, crowded, very beautiful
Hometown	Small, beautiful, ghost-town, friendly, touristic

Note. The adjectives that a *Spontaneous Explorer* chose to compare Istanbul with their Central European hometown. They explained that their hometown is 'ghost-town' because there is 'no one in the street at night' in contrast to Istanbul that 'lives 7/24'.

Explorer pushes the bubble's perimeter without redistributing flows. These patterned practices converge at the Bosphorus, which functions as a super-element that couples conceived scripts, perceived routines, and lived attachments, concentrating orientation, access, and meaning. Popularity-driven rankings, tunnel effects along high-capacity corridors, and seasonal yet durable affective cues reinforce centrality, while studentification and housing pressures mark social consequences. At the same time, sensory moments, 'vibes', and playful study-leisure blends reveal how lived experience resists full closure.

4.1. Mobility bubble and network sociality

Both the fundamental map and participants' maps and narratives show the confinement felt by foreign residents in Istanbul. They portray dense concentrations of people, roads, vehicles, buildings, and landmarks. This pattern is historically produced: the Old City's peninsular siting set initial limits, and twentieth-century policy choices (including where to place rapid-growth transit lines and stations) reinforced them. Later decisions influenced by commercial priorities (for example, privileging motorized traffic over pedestrians) and sociopolitical agendas (for example, restricting nighttime public transport to entertainment districts under conservative governments) further shaped spatial dynamics. Our goal is not a full sociopolitical analysis of infrastructure. Rather, using network sociality, we examine the 'mobility bubble', an overconcentration of people and urban elements that can limit discovery and dampen 'authentic' experience for newcomers.

4.1.1. Disembedded and generic

Following Simmel's ([1908]1950) 'Stranger', a foreign student initially occupies a position of otherness within urban anonymity. In the information age, however, relational dynamics exceed physical boundaries, and identities are increasingly assembled through network ties in which time and space are loosened (Castells 1996). 'Network sociality is not based on a shared history or a shared narrative. Instead, it is defined by a multitude of experiences and biographies' Wittel observes (2001, p. 65). Erasmus cohorts exemplify this disembeddedness in Istanbul: peers connect through shared traits (European origin, English proficiency, consumption habits) and sometimes perform 'DIY-biographies' (Wittel 2001, p. 66). Algorithmic filter bubbles then stabilize superficial engagement, limiting local interaction and reproducing consumption-driven routines. Yet students must still 'make a home'. As Russo and Richards (2016) note, even temporary visitors seek local embeddedness. Digital representations produced by similar foreign communities and local imaginaries on social media, including locative media, shape that attachment. Work bridging digital culture and sense-of-place research shows that place-based content circulation can deepen understanding and belonging (Özkul 2014; Schwartz 2014). Sharing local experiences, reducing unfamiliarity anxiety, stepping outside social circles, and aligning with city mobility patterns are strategies to challenge the bubble (see also Bork-Hüffer 2016; Monteiro et al. 2021). Our three personas trace distinct engagements with Istanbul's mobility culture and the tension between conceived space and lived experience.

The *Spontaneous Explorer* relies on bodily movement, sensory cues, and serendipity. Their bubble expands beyond dominant representations (Lefebvre's conceived space; Lynch's landmarks) into peripheral zones such as Sulukule's gentrifying areas and unmarked Bosphorus shores. Locative media function as enablers of serendipity, connecting to local networks and uncharted paths with affective potential. The *Well-Planned History Connoisseur* aligns more tightly with Lynch's paths and edges, reproducing conceived space through planned itineraries and functional nodes, augmented by digital information layers. The *Social Connector* constructs a relational digital-physical mobility bubble in which platforms mediate not only navigation but also the formation of community. Although consumption-oriented, this persona's sociability generates new encounter logics.

Residential choices reflect similar dynamics. International students cluster in socially and spatially distinct areas pre-identified through digital interfaces such as Google Maps. After arrival, bonds amplify informal placemaking around shared lifestyles. Central locations distance them from lower-income or migrant peripheries while aligning them with expat and upper-income groups, producing a bubble with clear boundaries. In Lynch's terms, paths and nodes (transit stops, campuses, social neighborhoods) form its backbone; peripheral low-income districts or areas lacking historical character define its edges. The result is a disembedded city experience framed by touristic and commercial zones, with limited connection to suburban life. Ongoing studentification in districts like Kadıköy and Beşiktaş (including price pressures on housing and services) merits further study.

This process is a kind of 'homemaking'. As Lynch (1960, p. 5) wrote, 'the sweet sense of home is strongest when home is not only familiar but distinctive'. Students value this familiar-yet-distinct identity while acknowledging the city's persistent unknowability: despite intensive movement, vast areas remain *terra incognita*. Satisfaction depends on balancing exploration with orientation. Urban infrastructure and locative media often underserve this liminal residency, but students' impacts extend beyond immediate adaptation. Digital platforms both standardize urban experience and enable digital placemaking (Halegoua and Polson 2021). Through crowd-sourced contributions (e.g. videos, photos, and reviews on Google Maps) temporary residents transform their attachment to Istanbul and leave material-discursive traces that shape the city.

4.1.2. Informational and technological

Locative media mediate the student experience and perception of the city. Many participants were long-time Google Maps users who relied less on it for navigation after two months in Istanbul, turning to Google Search, social media, and friends for discovery. Even those who ignored 'discovery' features read user reviews. Instagram, although not primarily locative, shaped visual engagement via geotags and maps. Students still leaned on Google Maps (particularly user-generated photos) for finding venues and making decisions: 'Pictures from this bar are very nice… the route is clearly shown. Also, the menu, so we can check prices', one noted. Instagram curated discovery; Google Maps supported wayfinding and choice. Participants typically followed default routes, sometimes longer than necessary, and several criticized Google Maps' omission of short-distance public transport, preferring Moovit for its integration with the local network.

Algorithms that privilege popularity can steer temporary residents toward the most traveled routes, creating digital 'desire paths'. Location-based rankings render some places highly visible while marginalizing low-scoring areas, sometimes coding them as unsafe (Ridell and Zeller 2013; Quercia, as cited in Lettkemann and Schulz-Schaeffer 2020). Istanbul's sociopolitical context and spatial segregation are thus mirrored and reinforced on platforms (see also Jansson 2019). The digitally integrated mobility bubble filters experience, obscuring the voices and spaces of marginalized neighborhoods and amplifying dominant imaginaries.

Smartphones act as cognitive extensions. During sketch-map exercises, many participants reached reflexively for Google Maps to verify shapes, indicating how pragmatic wayfinding tools become embedded in perception and behavior. As Wittel (2001, p. 68) argues, such technologies

prioritize 'mobility and speed' over narrative depth, turning sociality into informational 'catching up'. One *Social Connector* remarked, 'Foursquare was great because it was showing which venues are popular right now', highlighting the compression of social space into real-time metrics. Constraints matter as well: limited mobile data, device capabilities, language barriers, mismatches between app content and local knowledge, and enrollment in outlying campuses can restrict access to digital urban information and socialization spaces, producing a digital divide.

4.1.3. Ephemeral but intense

Participants often described urban experience with the term 'vibe', signaling affective atmospheres made from material, sensory, and bodily cues and shared feelings through which identities are expressed (Di Masso 2023; Gilli 2023; Heitz 2024). While 'produced vibrancy' is a strategy for urban competitiveness (Nicodemus, as cited in Heitz 2024), our participants associated vibe with human presence and happiness: 'strangers' chilling on the grass in Maçka Park, visiting Osmanbey's night bazaar, or dancing at the terrace of a restaurant-bar in Taksim. These accounts align with Anderson's (2009) analysis of affective atmospheres.

Material interfaces matter. A participant preferred Galata's cobblestones ('nice', permeable) despite harder, slippery walking. If cobblestones are a physical interface, Google Maps is a digital one mediating presence and cognition. Because information dates quickly, current reviews matter: one student skipped the Anastasian Wall after outdated comments. Such transience, especially within semester-length stays, encourages intensive consumption of city and platform; break-time group trips resembled Wittel's (2001, p. 66) 'speed-dating': brief, essence-seeking encounters shared on social media.

4.1.4. Combining work and play

Positive experiences often centered on sensory moments: street-food aromas en route to class, Bosphorus sunset light during commutes, playful encounters with stray cats and seagulls. Commutes, as part of students' 'work", became opportunities for ludic engagement. Like creative-industry professionals (Wittel 2001, p. 68), students' tight-knit communities blurred schoolwork and leisure: co-organizing excursions, sharing homework, and treating joint study in cafés as playful social events. These practices integrate academic routines with the city and seek creativity and efficiency far from home.

In sum, transport infrastructure and technological interfaces sustain Istanbul's mobility bubble for Erasmus students and shape their urban experience. While exceptional and ephemeral moments occur, network sociality's emphasis on individualized projects over shared histories limits the breadth of experience available to temporary residents.

4.2. Istanbul's super-element: the bosphorus

Foreign observers have long emphasized Istanbul's image, often highlighting the Bosphorus (for example, Ogier Ghiselin de Busbecq; see Supplementary Appendix B). Our findings show continuity: students treat the strait as a distinctive edge that signals cultural, social, and economic contrasts and cluster in central Bosphorus neighborhoods for history, environmental qualities, connectivity, and ease of integration (see also Collins 2010). This contributes to segregation and heightens housing pressures for locals, even as some co-living arrangements create tactical opportunities for local students. Ferries render the strait a path and ports a network of nodes; the waterfront open-air mall Galataport, frequently cited by participants, exemplifies a globalization strategy that fuses tourism with curated consumption.

The Bosphorus also functions as a district where congested Istanbul 'breathes'. Crossings can become liminoid experiences enabled by individual agency and openings in the built

environment (Lefebvre [1986–1992] 2004; Vannini 2010). For students, moving between shores with ferries is not only a way to circumvent congestion but an encounter with a natural and historical landscape charged with emotional, aesthetic, and symbolic meaning.

Acting as a 'landmark of landmarks', the Bosphorus anchors imageable structures and seasonal cues that heighten legibility, from Hagia Sophia, the Blue Mosque, the Galata Tower, and the Maiden's Tower to bridges, promontories, and spring judas blossoms. References to rhythms of light and breeze and to lesser-known vantage points indicate a shift from visual consumption toward grounded placemaking. In this sense, the strait serves as a 'system of orientation' (Lynch 1960, 7), akin to Lynch's historical examples (129–130). We therefore argue that the Bosphorus warrants recognition as a context-sensitive 'super-element': it couples all five Lynchian elements while exerting outsized influence on orientation and choice. It is simultaneously a path (ferries and bridges), an edge (the continental divide), a district (contiguous waterfront bands with distinctive activities), a network of nodes (piers as hinges), and a constellation of landmarks. Compared with many global metropolises, Istanbul also maintains an unusually extensive municipal ferry network, which amplifies the Bosphorus's path–node functions (see Supplementary Appendix C, Figure c1). It is also a site of infrastructural convergence, where metrobus and Marmaray corridors feed waterfront interchanges and compress time–space toward central shorelines, reinforcing tunnel effects in networked infrastructure (Graham and Marvin 1996). Platform rankings, user images, and default routing further foreground waterfront venues and vistas, while diaries and walk-along sessions register sensory cues that participants use to orient and narrate the city. This account resonates with hydromorphology, waterscape, and fluvial-urbanism research that treats rivers and shorelines as multi-scalar orientation devices (Gurnell et al. 2016; Luo et al. 2022).

4.2.1. Conceived scripts, perceived practices, and lived attachments

The Bosphorus concentrates the effects of planning, marketization, and platform mediation (conceived space), organizes everyday routing and access (perceived space), and anchors affect, memory, and meaning (lived space). Three corridorized signatures recur: (i) node amplification at shore-adjacent intermodal interchanges such as Kadıköy and Beşiktaş; (ii) origin–destination narrowing along metrobus and Marmaray segments that compress time–space between high-value districts and yield a limited set of preferred cross-city links; and (iii) platform-driven visibility skew in discovery practices, whereby redeveloped waterfronts and nearby venues are repeatedly surfaced and revisited because they are easy to find, evaluate, and coordinate around. These patterns align with Istanbul's cycle of selective centrality and waterfront consumption (Bartu Candan and Kolluoğlu 2008; Enlil and Dinçer 2022; Keyder 2005; Lovering and Türkmen 2011), translating planning abstractions (representations of space) into routing and ranking defaults (spatial practice) through a platform interface such as Google Maps that is itself a representation of space yet, in use, participates in representational spaces (Lefebvre [1974]1991).

Corridor investments shortened trips among high-value districts while leaving peripheral links comparatively slow, funneling flows toward the shore (Bartu Candan and Kolluoğlu 2008; Keyder 2005). Waterfront redevelopment produced consumption-oriented precincts, such as cruise-terminal and mall hybrids, that stabilize attention and repeat visitation (Enlil and Dinçer 2022; Lovering and Türkmen 2011; Öncü 1997). Heritage branding and eventization along the Golden Horn and the Bosphorus created dense strings of landmarks that platforms render highly imageable, while governance choices over redevelopment, night service, and security shape waterfront access (İkizer 2022; Şevkin and Gül 2025). Consistently, our qualitative materials show dense circuits among the Beşiktaş–Karaköy–Kadıköy–Üsküdar axes, heavy reliance on shore-touching interchanges, and comparatively sparse engagement with peripheral districts even where travel times are similar, a channeling characteristic of abstract space oriented to quantification and logistical control (Lefebvre [1974] 1991, 338–339).

Alignment among conceived scripts, perceived practices, and lived attachments peaks at the Bosphorus, but its modalities vary by persona. The *Well-Planned History Connoisseur* follows platform-guided itineraries that string heritage nodes along the shore, with visit decisions hinging on review volumes and ratings. The *Social Connector* co-produces alignment: repeated patronage of ranked waterfront venues and events reinforces popularity and stabilizes centrality, while images, check-ins, and reviews feed back into visibility metrics. The *Spontaneous Explorer* shows partial misalignment: scenic ferries, peripheral shore walks, and niche blogs expand the bubble's perimeter and thicken edges into lived places, yet dispersed practices rarely exceed platform thresholds, leaving the dominant conceived space intact. Thus, alignment-heavy modes harden corridorized waterfronts, while tactical misalignments create localized novelty without redistributing flows.

4.3. Modalities of spatial production

Beyond the Bosphorus, personas function as analytic lenses for reading spatial production through Lefebvre's triad, clarifying how infrastructural and platform scripts are taken up or refused, where practices reproduce centrality, and when tactics briefly reconfigure legibility.

Across the sample, perceived space comprises patterned movements along high-capacity corridors (metro, metrobus, Marmaray) and ferry lines, expressing tunnel effects in which time–space compression privileges central districts and waterfront nodes. All three personas share the bubble's geometry but vary in variance and destination mix: the *Spontaneous Explorer* undertakes longer, higher-variance excursions (forests, Black Sea villages, peripheral shores) and uses ferries as detours; the *Well-Planned History Connoisseur* follows default intermodal chains linking central heritage sites; the *Social Connector* concentrates evening and weekend flows in studentified and elite districts, where repeat visits stabilize a narrow, dense activity band.

Planning and platformization jointly script abstract space optimized for throughput and consumption. Corridor investments, waterfront redevelopment, and venue clustering set the framework, while locative platforms translate it into everyday heuristics via default routing, popularity rankings, and visibility thresholds. Personas align differently with these scripts: the *Spontaneous Explorer* bypasses defaults (choosing ferries or footpaths that do not minimize time; consulting niche blogs rather than high-volume ratings), surfacing residual spaces that abstract space marginalizes; the *Well-Planned History Connoisseur* aligns most tightly, letting user review counts and routing recommendations structure visits; the *Social Connector* co-produces conceived space by repeatedly patronizing ranked venues and broadcasting them through photos and check-ins, consolidating consumption corridors.

Lived space saturates movement with sensory attachment, memory, and meaning. Two results stand out. First, the Bosphorus works as an affective orientation device across personas: sunset ferries, seasonal blossoms, and emblematic vistas provide recurrent anchors for narrative and wayfinding. Second, persona-specific tactics refract common infrastructures into different lived experiences: the *Spontaneous Explorer* cultivates capaciousness through slow time, serendipity, and embodied discovery; the *Well-Planned History Connoisseur* cultivates continuity by stitching monuments and districts into coherent itineraries that support mnemonic legibility; the *Social Connector* cultivates sociability by synchronizing with peers and events, turning nodes into stages for collective performance and using the city as a networked calendar. Together, these patterns underscore Lefebvre's ([1974]1991, 26) claim that abstract space never fully closes over lived space. Even within a bubble, difference is produced.

5. Conclusion

International students act as sensitive seismographs of Istanbul's urban condition because their practices are neither fully touristic nor fully resident. Read through network sociality and Lefebvre's triad, their traces make three features especially legible. First, *algorithmically channeled urbanism*:

default routing and popularity-ranked discovery align with corridorized planning priorities, producing a legible yet selectively imageable city and sustaining a mobility bubble. Second, *a Bosphorus-centered orientation regime*: the strait couples paths, nodes, edges, districts, and landmarks, concentrating attention and attachment along the central waterfront where historical imageability meets curated consumption. Third, *stratified accessibility under restructuring*: residential and social concentrations map onto high-value central districts and waterfronts, while peripheral districts remain cognitively off-map, reproducing unequal geographies documented in Istanbul's neoliberal transformation.

International students are not passive readers of these scripts. They produce space in at least four interrelated ways. *Platformed placemaking* occurs as user photos, ratings, and reviews circulate, extending lived space into metrics that feed back into conceived space. *Concentrated patronage* in consumption-scapes stabilizes specific corridors and venues and contributes to studentification in central districts. *Route standardization* reproduces tunnel effects, yet small-scale tactics such as ferry detours, nature-fringe excursions, and niche-blog discovery constitute *micro-innovations that diversify imageability at the margins*. Through online and offline networks, students also codify an aesthetic of 'vibe' and rhythm that reinforces the Bosphorus-centered orientation regime.

These patterns yield a shift from alignment and misalignment to spatial effects. Centrality is reproduced when perceived practices track conceived scripts and lived attachments cluster in the same places, as in the *Social Connector*'s dense circuits and the *Well-Planned History Connoisseur*'s reliance on default routes. Ratings, images, and repeat visits then strengthen visibility algorithms and attract venue investment, closing the loop into conceived space. By contrast, the *Spontaneous Explorer* expands the bubble's perimeter and thickens edges into lived places, but dispersed, low-volume excursions rarely cross platform thresholds that would recode the conceived, leading to micro-diversification rather than macro-redistribution. Across personas, ferries interweave linear transport schedules with cyclical diurnal and seasonal flows, qualifying corridor logic without abolishing it and helping to explain why the Bosphorus aggregates Lynchian functions while sustaining strong lived attachments.

We distill three propositions for platformed mobilities in Istanbul. *P1*, *platform translation*: conceived space is enacted not only by planners and developers but also by algorithmic ranking and routing that canalize perceived practices, with super-elements serving as especially efficient translation zones. *P2*, *thresholded inscription*: the passage from lived to conceived space is mediated by popularity thresholds, so dispersed tactics seldom alter rankings or routes unless they accumulate. *P3*, *convergence at super-elements*: super-elements arise where corridorized redevelopment and affective orientation couple, producing recurrent triadic closure and outsized presence in city images.

A few limitations temper these claims. Personas are heuristic lenses rather than ontological types, and individuals shift modalities across weeks and tasks. University-mediated recruitment likely overrepresents centrally located, Anglophone, and higher-SES students. Diary gamification may induce reactivity, and walk-along sessions provide depth vignettes with a smaller sample rather than saturation. We therefore treat cross-method persistence as suggestive.

In sum, situating international student personas within Lefebvre's triad clarifies how a bounded, platformed city is made and remade in practice. Istanbul's mobility bubble is the moving frontier where conceived abstractions meet lived tactics, channeled by infrastructures and amplified or muted by algorithms, with the Bosphorus functioning as the system's hinge. Future work should track modality transitions longitudinally, test P1 to P3 in comparative settings such as the Thames in London, the Nile in Cairo, and the Han in Seoul, and examine gendered night mobility and safety governance as additional alignment mechanisms.

Notes

1. According to 2024 data from the Council of Higher Education (YÖK), the number of international students arriving in the country is 338,161.
2. In this study, 'international students' primarily refers to Erasmus + participants. The Erasmus + program is the EU's flagship initiative supporting student mobility across European universities, enabling participants

to study abroad for 3–12 months while earning academic credits. It fosters cross-cultural exchange, language skills, and personal development within a structured international education framework.

3. Interactive version of the maps are available at [1].
4. The three Lynchian districts somewhat overlap with the historical administrative districts surrounding the Ottoman Constantinople: Galata, Eyüp, and Üsküdar. Historically, these were collectively referred to as 'Bilad-ı Selase', or 'Three towns' (İnalcık 2019).

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Ethical approval

This study received ethical approval from Galatasaray University's Ethical Board for Scientific Studies and Publications on 27 November 2021 (Decision No. E-65364513-050.06.04-16.169). The study protocol covered the survey, in-depth interviews, mental-map exercises, the WhatsApp-based diary study, and the 'walk-and-talk' observations. All participants were adults and provided informed consent before any data collection. For the survey, interviews, mental-map exercises, and walk-and-talk sessions, participants signed written consent forms after receiving an information sheet that described the aims, procedures, risks and benefits, voluntary nature of participation, and data handling. For the WhatsApp-based diary study, written consent was obtained during enrollment; daily submissions were voluntary and could be discontinued at any time. No deception or covert observation was used. Participants could withdraw without penalty. Participants granted consent to publish anonymized quotations and research materials pertaining to them in scholarly outlets. We do not publish any images, audio, video, or map sketches that could reasonably identify an individual. Where a contribution could be indirectly identifiable, we obtained additional written consent to publish that specific material. Personal names and direct identifiers were not recorded; pseudonyms are used throughout.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Anonymization and data handling

Direct identifiers were not collected. Indirect identifiers were minimized during transcription and cleaning. Interview and diary data were assigned study codes and stored in encrypted form on institutional servers accessible only to the research team. Consent forms are stored separately from data. Data will be retained for five years in accordance with institutional policy and then deleted or archived in anonymized form.

Use of administrative and third-party/platform data

The Istanbulkart mobility dataset was provided by Istanbul Metropolitan Municipality under a data-sharing agreement for research purposes. The dataset contained aggregated and de-identified records of card uses by non-resident foreign and student users; no personal data were accessible to the authors. Analyses and reporting comply with the agreement and applicable data-protection requirements. Any screenshots or schematic reproductions of platform interfaces and public ferry network maps are used with permission or under applicable exceptions; no personal platform data are disclosed. Our use of Google Maps and other locative services respects the respective terms of service; we neither scraped nor redistributed platform data.

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