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Marija Miloshevska Janakieska

International Balkan University, Skopje, North Macedonia, <https://orcid.org/0009-0008-9813-6235>

Faton Kalisi

International Balkan University, Skopje, North Macedonia, <https://orcid.org/0009-0008-4927-6100>

Harika Shehabi

International Balkan University, Skopje, North Macedonia, <https://orcid.org/0009-0002-8706-8317>

Correspondence concerning this article should be addressed to Marija Miloshevska Janakieska.

Email: marija.miloshevska@ibu.edu.mk

From Heritage to Design: Pattern Extraction and Landscape Interpretation of the Alaca (Painted) Mosque, Tetovo, North Macedonia

**Marija Miloshevska Janakieska, Faton Kalisi and
Harika Shehabi**

Abstract

This study is focused on cultural heritage and how it can influence the contemporary spatial design through a design oriented educational workshop focused on the Alaca Mosque in Tetovo, North Macedonia. The research aims to analyze the historical development, visual identity, and ornamental language of the mosque and to translate these findings into landscape design proposal for its surrounding urban context. The methodology consists of historical review of the mosque, analytical documentation of architectural details and ornamentation, extraction of geometric and floral patterns, and their reinterpretation into contemporary design elements. The analytical focus includes detailed research of the decorative elements of the mosque, based on the site observation and the literature review – its geometry, rhythm, color palette, texture, and proportional relationships—which served as the conceptual base for the further design translation process. The outcome of the whole process is a landscape concept along nearby river and public park, inspired from patterns found in the mosque, that reflects the symbolic meaning. At the same time, the landscape proposal addresses current spatial needs. By demonstrating how architectural identity from historical structures can be systematically decoded and reinterpreted into modern urban landscape interventions, this research contributes to the field of heritage-based design. Using a simple workshop-based methodology, the study also emphasizes the educational value of engaging students in analyses of cultural heritage as a tool for developing culturally responsive design thinking.

Keywords: Heritage, patterns, landscape interpretation, Alaca Mosque

Introduction

The process of architectural and urban design is very complex and consists of many aspects. Prior to the process of design, there are many analytical phases that should be acquired. Cultural heritage plays a vital role in these analyses, especially in contexts where important historical structures form the local identity (Khazene & Bensliman, 2024). These analyses lead to heritage-based design approaches that connect the past with the present. They often consist of transforming architectural, artistic, and cultural elements into meaningful architectural, urban and landscape interventions that meet contemporary needs. These approaches in the design are one of the most important segments for maintaining the identity of the place and promoting cultural continuity (Kuipers & de Jonge, 2017).

The main object of this study is the Painted Mosque in Tetovo, North Macedonia which dates back from the 15th-century Ottoman era. The location of the Mosque is near Pena River in Tetovo, North Macedonia. The mosque is a unique remarkable structure with richly colored floral and geometric frescoes, painted with a special technique using thousands of eggs. These decorations give a special value to the mosque, since it is one of kind and unique in the region (Ramani Murseli, 2022). Alaca Mosque presents a perfect case study for this research, through which the connection between the heritage and design can be seen. It is a great source of inspiration with beautifully decorated facades, amazing architectural details, and characteristic polychromatic ornamentation. Moreover, the visual and tactile language of the building is phenomenal. The visual elements – geometry, floral motifs, layered compositions, and vibrant color system in combination with the tactile elements – different textures on the walls make the mosque truly unique. The mosque stands not only as a religious monument but also as a symbol of Tetovo's cultural identity, making it a valuable subject for analytical and design-oriented research.

This study is based on an interdisciplinary workshop organized through a collaboration between the Faculty of Art and Design, the Department of Architecture, Faculty of Engineering at International Balkan University and Interior Architecture Department, Faculty of Architecture, at Yeditepe University. The workshop started with a visit to the Alaca Mosque, where students guided by the professors were doing on-site observational exercises, sketching, photographing, and taking notes (Figure 1).

Figure 1

Photos from the visit of the mosque.



Source: Authors.

The workshop continued the second day at the Innox Center with analytical sessions, presentations, and feedback meetings. During the second day, the students analyzed the photographs and sketches, did research on the historical review of the mosque, and offered a design proposal informed by the gathered documentation (Figure 2). In the following weeks, students were working on the design proposal and preparing the graphical representations for the upcoming exhibition.

Figure 2

Photos from the workshop.



Source: Authors.

The workshop concluded with an exhibition where all the works of the students were exhibited (Figure 3). The exhibition consisted of different results from the participants of different departments.

Figure 3

Photos from the exhibition.



Source: Authors.

This study presents the process and outcomes of a workshop-based pedagogical approach in architectural education. Within this framework, students, guided by professors, explored the historical development, visual identity, and ornamental characteristics of the Alaca Mosque, and translated their findings into a contemporary landscape design proposal for the surrounding urban context.

Literature Review

There are several studies which analyze the influence of culture and heritage on architectural design. Previous research by Al-Adilee (2024) indicates that cultural and historical contexts profoundly influence architectural design. This article shows how architects draw on local heritage, materials, and symbols—while navigating globalization—to create culturally sustainable, context-sensitive designs that preserve and revitalize cultural identity.

Ornament in architecture occupies a complex position, shaped by its deep connection to the human body, symbolism, and decorative arts. Thinkers from Ruskin to Sullivan, Semper, and Alberti show that ornament reaches its highest artistic form when figural motifs are reinterpreted and abstracted into a harmonious mathematical unity between part and whole (Durgut & Akalın, 2022). Studies from Mustafa and Hassan (2013) and similar studies are focused on pattern analyses in Islamic and Ottoman architecture. Similar studies explore how local heritage can influence the design of new landscape proposals.

The importance and meaning of the Alaca Mosque should be understood within the context of Ottoman architecture in the Balkans. Early Ottoman architecture represents an initial phase in the development of a rational architectural style. A key study on Ottoman architecture in Europe, particularly in the Balkans, is “Ottoman Architectural Works in Europe, Yugoslavia, Volume 3” by Ekrem Hakki Ayverdi (1981). This study discusses specific cities in Yugoslavia, particularly Tetovo. It examines architectural identity, urban development, and the positioning of Tetovo within its regional context. Tetovo’s location at the foot of Sharr Mountain and its possession of a fortress place the Alaca Mosque in a strategic position, a factor further influenced by the architectural triad. In his detailed research, Ayverdi also provides information, old photographs, and detailed drawings regarding the mosque’s interior architecture, mimbar, mihrab, and prayer hall. The author provides a detailed analysis of the mosque’s architectural elements. Isa Bey commissioned the architecture of the mosque, and he also commissioned the hammam, which is one of the three sections of the mosque complex (Ibrahimgil, 1997).

Tetovo is one of the most important urban centers of the Ottoman Empire in the region of North Macedonia and serves as a significant example where, in some cases, the model of the Islamic triad in architecture and urban organization has been implemented: mosque - hammam - han. This model, which represents a balance between spiritual, physical, and economic life, is clearly reflected in the old part of Tetovo. Although this book (Kumbaradži et al., 1998) focuses heavily on Ottoman

works in Skopje, it systematically and intelligently addresses the Islamic Triad, not only discussing the triads in Skopje but also touching upon the Alaca Mosque complex. It analyzes not only the architectural aspects but also the urban scale, offering a fresh perspective on architectural history and theory, and serving as a supportive work for future studies. Due to its location and cultural orientation, the city of Tetovo has adopted a rural and provincial architectural style. The most important and impactful aspect of the Alaca Mosque is its architecture and stance, which are in harmony with the city's fabric and nature. In this book, the author conveys all these contexts to the reader (Kumbaradži et al., 1998).

The mosque follows a central prayer hall organization, with the mihrab positioned on the qibla wall and the minbar located adjacent to it. The spatial composition is defined by a symmetrical arrangement of structural and ornamental elements. Another element that presents us with today's Alaca Mosque and makes it such a valuable and accepted structure is the ornamentation and wall paintings of its facade. Perhaps this is why the mosque is so valuable and meaningful, as it was originally a foundation established by two women. The 19th century certainly plays an important role in this; in this research, we see the most beautiful interpretation of the integration of wall art and painting art with a mosque, and how the Baroque and Rococo periods, which we will discuss later, come together with Andalusian influences and miniature-like art to create a place of worship (Demirarslan, 2016).

Methodology

The methodology of this study is structured, heritage-based design approach combined with field visit and observation, research of the historical overview, pattern analyses, and design translation, based on the literature review.

The first step was the field observation and visual documentation. The field observation was performed on 31st of October, 2025. Students performed on-site sketching, photographing, and pattern tracing to record architectural details, ornamentation, materials, textures, and colors. In addition, spatial relationships, circulation and connection with context were also documented.

A chronological timeline of the Alaca Mosque was created using archive sources, historical texts, and visual documentation. The students identified the key construction and renovation phases so that the evolution of the building could be understood. Findings were represented as sketches of different details and elements on one poster.

Moreover, analyses were performed where students were researching concepts such as geometric composition, repetition, rhythm, symmetry, texture and color relationship. The analyzed patterns were converted and translated into conceptual landscape design elements. The analyzed details and elements were used, transformed and implemented into landscape design.

This methodological framework allowed the research to move systematically from heritage documentation to the creation of a contemporary, pattern-inspired landscape design proposal.

Discussion

Historical Review of the Alaca Mosque Construction Origins and Cultural Context

One of the most magnificent examples of Islamic architecture from Tetovo's Ottoman era is the Painted Mosque (Alaca Mosque), which is located near the town centre on the left bank of the Pena River, which is one of the most important remains of Islamic culture and civilisation in the Balkans. The locals call this mosque *Pasha's Mosque* because Abdurrahman Pasha rebuilt it from the base in 1833. Its original name, "*Alaca*," means "*Painted*" in the ancient Ottoman language (Lewis, 1979, pp. 322).

Early Ottoman works evolved as Ottoman control stretched over the Balkans. Based on a waqf (endowment) foundation, this mosque has played a major role in the region's urban growth. Tetovo is one of the earliest examples of rural and provincial architecture, given its urban scale and location at the base of the mountain. The mosque has maintained its basic provincial architecture and its harmony with the urban fabric over time, despite restorations in the 17th and 18th centuries and the addition of Modern and Baroque elements to its facade, which gave the edifice a European air and served not only as a place of worship but also as a social and symbolic centre of the Ottoman city (Pavlov, 2009, pp. 108-110).

This took place in the larger framework of Ottoman modernization and the integration of Western influence into provincial architecture, especially Ottoman Baroque and Rococo aesthetics. A stunning and varied example of both Islamic oriental art and Western painting, the rich, multi-coloured paintings included plant murals, architectural panoramas, and miniature-like drawings. In this way, the mosque contributed significantly to Tetovo's multi-layered architectural character as a fresh example of an eclectic style as well as a religious structure in the city center adjacent to the Pasha's home. While studying these scenarios, another architectural and cultural

theme catches our eye: the “Islamic Triad.” The Islamic Triad can be defined both as an architectural trilogy and as an indicator of a cultural and life ritual. The Alaca Mosque is one part of this trilogy; immediately across the river is the Cifte Hamam (public bath), and behind the Pasha’s mansion (konak) is the inn(han). This trilogy was conceived as a complex, where visitors would first wash and cleanse themselves in the baths, perform their prayers in the mosque, and rest in the inn. This trilogy is a design frequently encountered in the Ottoman Balkans (Ibrahimgil, 1997).

Timeline of Modifications and Restorations

According to the vakifname of the mosque, as reported in secondary sources, the foundation is attributed to the sisters Hürşide and Mensure (Pavlov, 2009; Ibrahimgil, 1997). The founding charter specifies who creates the vakif, what it is endowed with, and how it must operate indefinitely). In the meantime, it was reconstructed in the eighteenth century. The Vakifname adds that the Hurside and Mensure sisters also constructed the “Cifte Hamam,” a public bath, close to the Alaca Mosque. The sisters Hurside and Mensure, who relocated to Tetovo from Anatolia, commissioned the construction of the Painted Mosque. The year of Hurside’s passing is still uncertain; however, she was buried in the mosque garden. Other scholars claim that the sisters Hurside and Mensure restored the Alaca Mosque in 1564. According to the inscription on the mosque, Abdurahman Pasha built it, and its current architectural style originates from the first part of the 19th century. Its design is similar to the foundation of another building, most likely the mosque with the same name, Alaca, that was destroyed in the town’s late 17th-century fire. Therefore, contrary to what certain academic publications state, the current Painted Mosque in Tetovo was not constructed in the 17th century. In such a scenario, this date would relate to a different mosque that was destroyed to the ground, as the lines mentioned in the inscription tell us (Pavlov, 2009, pp. 108-110).

In 1991, the Islamic Union took the initiative to restore these walls. Due to its exceptional architectural and artistic qualities, this mosque is protected by UNESCO.

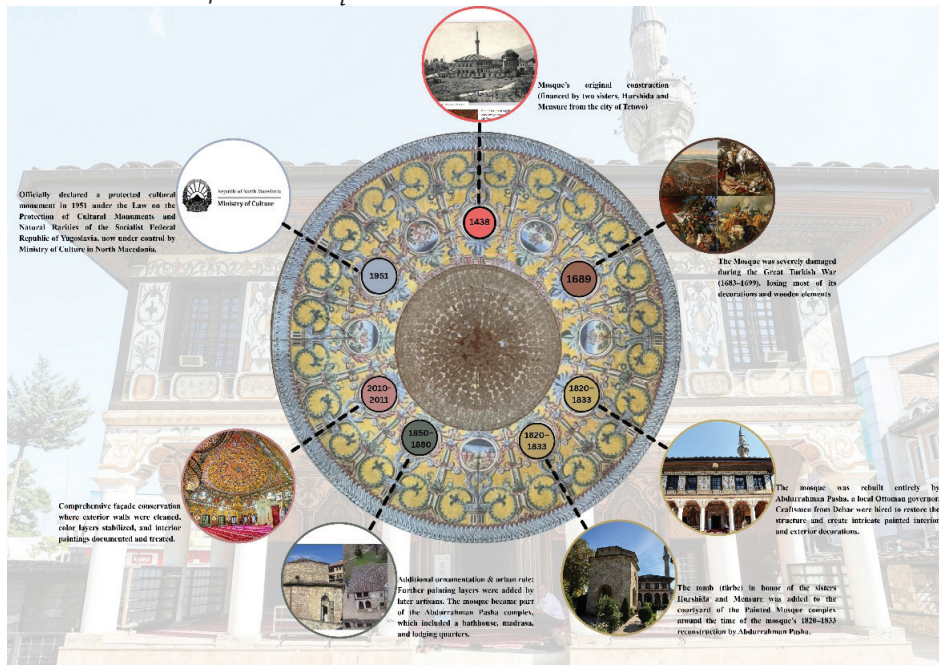
During the conflict that began in April 2001, the mosque was attacked, damaging the building’s main wall. The walls had nine gunshot holes, and the windowsills were damaged.

Following this assault, the mosque was the target of three further attacks, which caused minor structural damage. Additionally, a bronze inscription pointing to the mosque’s status as a cultural and religious landmark is stolen (Shehapi, 2002, 00. 34).

The foundation of its current appearance is based on the restorations carried out in 2010–11. The main goal of the 2010–2011 restoration project at the Alaca (Painted) Mosque in Tetovo was to preserve the painted surfaces and outside fabric, which had been damaged by ageing, moisture intrusion, and material deterioration. A rare example of late Ottoman painted architecture in the Balkans, the intervention sought to stabilise the building while maintaining its unique polychrome ornamental program. Stabilisation of the facade, restoration of degraded surfaces, and protective coatings for the external paintings were examples of conservation measures. International funding for the project in 2011 allowed for a more methodical approach in line with modern conservation standards. The pieces avoided stylistic reconstruction in favour of minimal intervention and visual continuity. All things considered, the restoration made a substantial contribution to the mosque's long-term preservation and ongoing use as a place of religious and cultural significance. The historical review of the mosque, as well as the timeline of the modifications and restorations, is presented graphically on Figure 4.

Figure 4

Historical review of Alaca Mosque.



Source: Authors, based on workshop outputs (2025).

Architectural Character and Key Stylistic Phases

The interior of the Painted Mosque has a nearly square plan, measuring approximately 10×10 meters. The praying hall is covered in domes and has a distinctive volume. This hall has a square layout and is accessible through the gate, which has an inscription in Ottoman script. The dome defines the interior space, while the exterior is covered by a pitched roof structure. Thirty lights, fifteen up and fifteen down, illuminate the inside of the mosque.

The structural system includes supporting elements along the northern façade, consisting of multiple piers and columns that reinforce the wall construction. On the north side, a series of supporting elements contributes to the stability of the structure.

The mosque is of the Early Constantinople style of Ottoman construction, which is characterised by a single dome with a porch on the side of its entry. The square foundation of the central area is hidden from view from the outside by a dome. The mihrab is positioned on the qibla (southern) wall, indicating the direction of prayer toward Mecca, and the minbar is placed adjacent to it, in accordance with standard mosque architectural principles. The mihrab is richly decorated, with its upper section composed of circular fields containing verses from the Quran.

On the western side of the interior is the mahvil (elevated gallery), consisting of semi-circular projections and extending across the width of the structure. The gallery is supported by profiled columns and is integrated into the two-story porch system. Decorative niches and inscription panels are present on the northern and western walls, and should not be interpreted as functional mihrabs.

Turkish tiles are used to create a four-ridged roof that covers the entire structure. On the south side is a minaret with a hexagonal base and one serefe (balcony). The four window openings, set in two rows, provide light. They are enclosed on the inside as well as the outside, and they are elaborately adorned with slabs of perforated stone that add to the building's overall splendour.

This mosque stands out because of its 19th-century painted ornamentation. For this aim, Abdurahman Pasha hired skilled workers from Debar to paint the decoration using oil paints; these artists were most likely the same ones who painted the Arabati Baba Tekke. The façade has been extravagantly painted using a fresco technique that resembles marble. Four rows of vertically organised rectangular fields with circular star-shaped motifs are painted on the east, north, and south facades.

These fields are divided by painted columns that end in an “S” shape below the roof in the last row. The porch is decorated with stylised geometric and floral decorations. The mosque’s interior is very vibrant since it features landscape elements in addition to geometric and floral decoration. The representation of Mekka, a unique and possibly unique example of the picture of this monument of the Prophet in Southeast Europe, is particularly appealing among the pictorial decorations (Mediu-Dushi, 2010, pp. 21-23).

The türbe (mausoleum), where Hurside Hanum is buried, is located northwest of the mosque. It is a sort of open türbes, with a stone base shaped like an uneven octagon. It is thought to have been constructed in the sixteenth century, despite the lack of written evidence. It adds to the Painted Mosque’s urban atmosphere with its balanced proportions. The structure was originally covered by a dome, and its balanced proportions contribute to the overall urban composition of the Painted Mosque complex.

Analysis of Architectural Details and Ornamentation

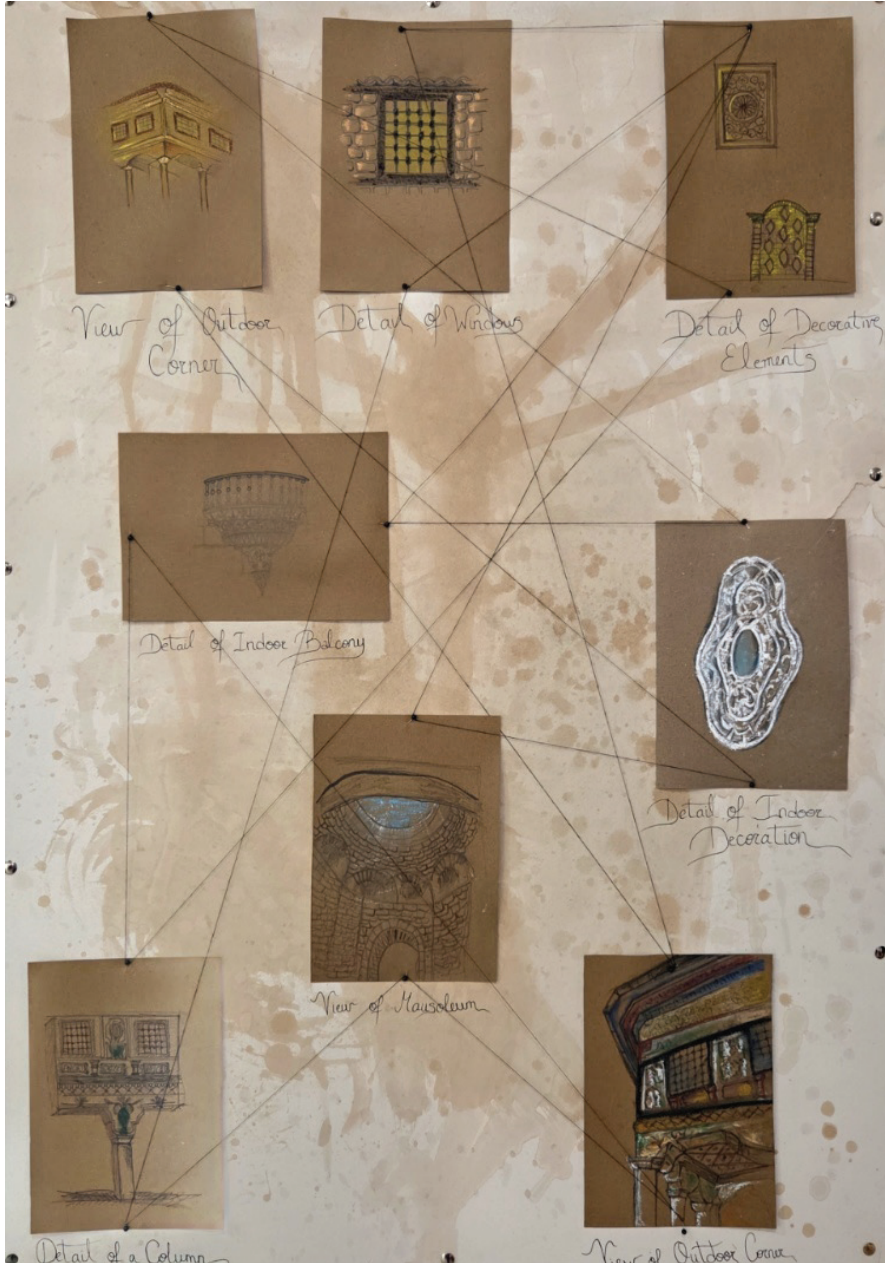
As part of the workshop, students were analyzing the architectural details and ornamentation of the mosque, both on the exterior and in the interior. Figure 5 is the final result of this phase – a poster with the most important details and elements.

As part of this phase, the following elements were analyzed:

- Geometric patterns: types, mathematical logic, repetition systems
- Floral and vegetal motifs
- Color palette: symbolism, relationships, layering techniques
- Decorative compositions: façade, interior frescoes, ceiling details
- Spatial characteristics: light, proportion, rhythm, transitions
- Patterns as carriers of cultural meaning

Figure 5

Analysis of Architectural Details and Ornamentation.

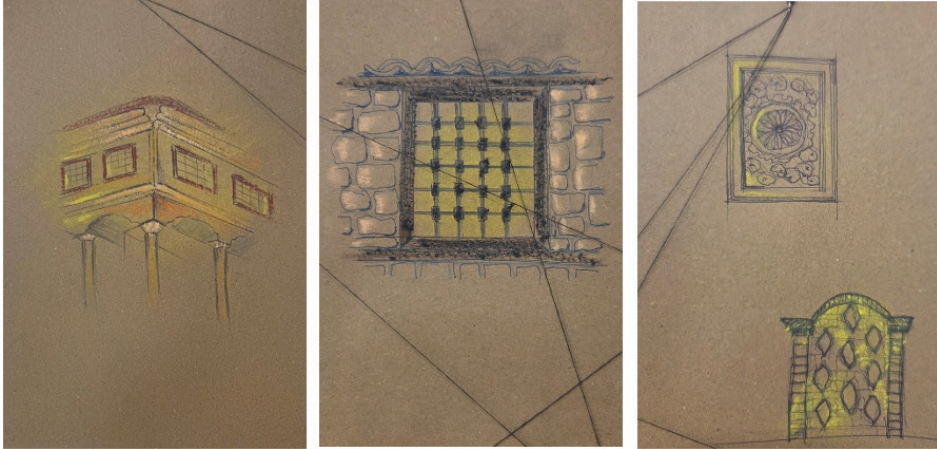


Source: Authors, based on workshop outputs (2025).

Figures 6 and 7 show the architectural details and ornamentation, outside views, structural and non-structural elements, windows and opening details and decorative elements with rich geometrical and floral motifs.

Figure 6

Architectural details and ornamentation: a. View of outdoors; b. Corner detail of window; c. Detail of decorative elements.



Source: Authors, based on workshop outputs (2025).

Figure 7

Architectural details and ornamentation: a. Detail of indoor decoration; b. View of Mausoleum; c. Detail of a column; d. View of outdoor corner.



Source: Authors, based on workshop outputs (2025).

Results

The decomposition of the identity of the Alaca Mosque in the architectural, ornamental, and spatial context turns out to be the main source of materialization of the proposed landscape plan. Through the transformation of the conceptual decomposition of the identity of this cultural heritage, a new spatial narrative resulted, where design principles are intertwined in a contemporary spirit, with the aim of being used as a mediator of cultural memory and current urban needs.

Site Description: River and Park Context

The surrounding area of the mosque and the riverbank has not been exploited adequately. The current circulation system is formed naturally, while there is no visual or symbolic link with the monument. The area is a transit place, failing to provide meaning and active engagement of visitors. There is a lack of appropriate green space organization, opportunities for entertainment, and leisure activities for pedestrians. Although it has the potential to become an attractive and resting zone with low intervention, this is not being used. The connection of this zone with the neighboring ones makes this zone self-isolated and distinct from the urban dynamics. This results in the loss of opportunity to become an active and cohesive centre.

Conceptual Landscape Strategy

The conceptual landscape strategy is built on the principle of pattern as a generative language of spatial organization. Geometric and floral patterns, derived from the ornamentation of the mosque, were analysed as systems of rules rather than forms to be replicated, being interpreted as rhythmic structures that articulate the relationship between parts and the whole. These systems were translated into a contemporary geometric order that structures paths, squares, and spaces of standing, creating spatial hierarchies, axialities, and experiential sequences. The materiality and chromaticity of the design are conceived as a continuation of the visual and cultural memory of the historical object. The synergy of colours, tactility, and the ornamental identity of the monument, we use as an abstract design system to convert it into a contemporary landscape (Figure 8).

Figure 8

Conceptual Landscape Design.



Source: Authors, based on workshop outputs (2025).

Spatial and Visual Outcomes

In the selected location near Alaca Mosque, we redesign a promenade along the river that functions as a connecting axis between the monument and the city. For the redesign of this promenade, we have implemented the fragmentary heterogeneity of the decomposition of the identity system of the mosque, both at the functional and perceptual levels. We create spaces with geometric rules, with versatile and spontaneous pedestrian circulation, where the activity itself catalyses the visual and symbolic relationship of the location. The implementation of the axis, symmetry, hierarchy, whether visual or functional, and rhythm reflects the semiotic transformation of the location. Through this narrative we have a transformation of the current landscape and create a new identity. Through an analytical and critical approach to landscape, the potential of the location itself was exploited to the

maximum, with existing natural elements, architectural heritage values that exist around the area, and the community as a coherent urban structure.

Educational Output

In terms of pedagogical outcomes, the workshop produced results that go beyond the final design product itself, affirming itself as a structured learning and research process. Analytical diagrams, physical models, and conceptual drawings document a working methodology where analysis and design develop as interconnected and mutually generative phases. Students were involved in a continuous reflective practice, moving from empirical observation and reading of the context to theoretical abstraction and then to spatial articulation and synthesis. These results highlight the value of a pedagogical methodology based on cultural heritage as a research and investigation tool, where design is understood as a form of knowledge production (design as research). The overall process highlighted the potential of ornament and patterns not only as aesthetic components but also as conceptual structures and instruments of thought that can inform and enrich contemporary practices of architecture and urban and landscape design.

Conclusions

This study shows how a landscape design can be inspired by a significant cultural heritage through a pattern-based analytical approach. Alaca Mosque in Tetovo is used as a case study to show how a strong cultural identity can influence a design expressed through geometry, ornament, color, rhythm, and proportion. The inspiration is not used only as a decorative reference, but it is decoded and interpreted into the design language of the landscape.

The methodology based on a workshop was effective both as a research and educational tool. Several methods such as site observation, historical analyses, pattern extraction, and design translation, were used.

The result was a landscape proposal which strengthens the cultural significance of the place. This approach can be used and transferred to similar historically significant buildings, as a heritage-based design and urban regeneration. Further research could include implementing patterns-inspired design on a wider context, even within a wider urban context.

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