Editorial

Martin Wollensak

The significance of preserving cultural identity is one of the main topics of this current issue of Architecture Papers of the Faculty of Architecture and Design STU (ALFA), with articles ranging from analyses of urban spread and architectural heritage of the Saidpur village—one of the oldest in Pakistan—to discussion of the loss of cultural identity in the Southern Slovakian regions and efforts to save it through design and local artistic creation. In addition, contributions are provided on augmented reality and tangible user interfaces as an extension of computational design tools as well as on the importance of cultivating soft skills in design education.

Although on the surface of it, these articles may appear to be only tangentially connected to yield a common thread in this issue of ALFA, a closer inspection reveals multiple crosscurrents that intertwine each article with the other much tighter than one might think. As the world's population grows exponentially and becomes more diverse, coupled with advances in digital technologies, increasingly wide-spread industrial production, and rampant yet inescapable globalisation among nations, local traditions are unavoidably challenged in many corners of our planet to a point of loss of cultural identity. However, it is not just local traditions, regional differences and particularities that are under pressure, but also earth's resources, the environment, along with human social relationships in the daily conduct of our lives, our private spheres, and ultimately the general sustainability of the human existence as we know it.

There are certainly noteworthy efforts to mitigate the negative anthropogenic impacts on the environment, specifically within the building industry and its related sectors as many countries set requirements for sustainable design and energy performance of buildings and the assessments thereof. Consequently, there is a large number of standards, possibly more than appropriate, that architects and engineers are proscribed to follow. However, such standardisation can also have negative impacts on local cultural identity as it attempts to have an equalising effect across indigenous knowledge bases and differences where equalisation may not be needed. The imposed increase in entropy that removes local differentials and attempts to 'unify' design knowledge, building methods, methodologies, and overall conception of the idea of building appears to ignore and stand in regrettable contradiction to what has taken millennia to develop. It is true that the nature of the human habitat is a dynamic concept as it has been evolving continuously in various dramatic forms. Yet, we now appear to have arrived at the threshold of the great transition to ensuring a more sustainable future where homegrown knowledge in achieving the goals of sustainable human habitats all over the world can be critical in reconciling inevitable growth with preservation.

A truly sustainable building calls for individual site-specific solutions that are developed respecting regional otherness. Both architects and engineers must therefore train and be cognizant of the significance of sustainable planning in order not to become mere 'decorators'. To that effect, it is imperative to not only develop soft skills in design education, but also to be able to use state-of-the-art technologies that allow a full immersion into design, for example in the form of augmented reality. A world that is becoming closer through globalisation and digital technologies offers great opportunities in this area. Through the disappearing of borders, architects, engineers, urban planners, and locals get a chance to work together, cooperate, enrich themselves by learning from each other; understand and respect different architectural languages that would increase our creativity in the final analysis, allow for more tolerance, and enhance our perspectives by respecting local traditions and cultural identity. The flow of all this is only possible where entropy is small.

In the present issue, in the paper "*Saidpur village through architectural lens: Deciphering urban pattern and architectural heritage*", Ramsha Nazir Malik and Zhang Haiao endeavours to collect and preserve current and old accounts of Saidpur's urban growth and architecture. Saidpur is one of the oldest villages in Pakistan that contains the architectural art and culture of three religions: Sikhism, Hinduism, and Islam. The study is based on research through interviews, surveys, and onsite data collection, presented through images, drawings, records and mapping, survey infographics, tables, and analysis diagrams. Ramsha Nazir Malik's and Zhang Haiao's contribution attempts to collect, generate, and record information on evolution, history, vernacular architecture style, and heritage architecture of Saidpur, and to promote and present data for further heritage conservation and protection work in Saidpur.

Martin Uhrík, Alexander Kupko, Michaela Krpalová and Roman Hajtmanek contribute a very interesting article: "*Augmented reality and tangible user interfaces as an extension of computational design tools*". The paper envisions the use of augmented reality as an interactive and communication tool implemented in the architectural design research, education, and practice. The current knowledge and various applications of this immersive technology in the theoretical and practical field are summarised and focused on a very particular kind of the implementation of augmented reality called 'tangible user interfaces' in a computational design context. The outcome of the research is an adaptation of the originally GRASS GIS powered tool Tangible Landscape into Grasshopper 3D environment, more accurate and suitable for the architectural design workflow by means of 3D computation, algorithmic modelling and different scale management.

In "*Redefining the learning experience within the design education at Slovak University of Technology in Bratislava*", Michala Lipková, Zuzana Pergerová and Zuzana Turlíková present data gathered in an extensive survey on the future of design education investigating the key skills, knowledge and abilities of design students and recent graduates. The survey was conducted among current students and alumni of the Institute of Design at the Faculty of Architecture and Design of the Slovak University of Technology in Bratislava, followed by interviews with pedagogues, company representatives and Human Resources managers. The survey, among other questions, investigated the essential, key knowledge and capabilities of a well-prepared and competent design graduate of the future. The outcomes have led to identification of an essential soft skill set for a young design graduate.

In his study entitled "*Potential contribution of design in strengthening of regional identity in Southern Slovakia*", Tomáš Páriš and Veronika Kotradyová delves into the gradual loss of cultural identity as an undesirable but common reality in many regions of Slovakia, specifically, the Novohrad region where the society is potentially advancing too fast through new technologies, creating new habits. As a result, the authenticity of the original culture is suppressed at the expense of development and growth. Nonetheless, Tomáš Páriš and Veronika Kotradyová show how modern technologies and procedures may be able to help local cultures flourish. Through extensive research of tangible and intangible heritage, using structured interviews and field research, the designer can create a sufficient picture of the researched area. The results of this creative process are products that follow the design language of the area with a specific morphology and material composition. These products can also take the form of services and systems that help regional development.

It should be obvious to all in our profession that we need to take more responsibility based on sustainable planning and building in the preservation of our cultures and traditions as those manifest themselves in the architectural expressions in our communities. I wish for this and future issues of ALFA to provide valuable contributions in the transition to a climate-neutral architecture. Enjoy another excellent issue of ALFA.

Saidpur village through architectural lens: Deciphering urban pattern and architectural heritage

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Abstract: Saidpur is one of the oldest villages in Pakistan, its origin dates back five hundred years ago. Along with its scenic landscape, it has centuries-old historic importance as well. From the Mughal dynasty to subcontinent partitioning, this village has witnessed evolution of diverse eras. It displays architectural art and heritage of three cultures: Sikhism, Hinduism, and Islam, concentrated on one node in this place. Pakistan does not have any reliable system for recording, managing, and preserving heritage or platforms for recognition of heritage sites. As many other sites, the heritage of Saidpur is in demise and subject to vandalism today. It is important to bring forward the historic and architectural importance of this village globally. Before Saidpur's historical vernacular construction styles are completely lost, it is essential to record its authentic and onsite information so that history can be preserved, and further actions could be taken on its protection and preservation. The case analysis of heritage buildings can also provide inspiration and learning for the future. Hence, this paper shall record and discuss Saidpur's architectural and urban growth with time, its current situation, and analysis of its heritage architecture. This paper intends to collect and preserve both current and old accounts of Saidpur's urban growth and architecture by research through interviews, surveys, and onsite data collection, and present them through images, drawings, records and mapping, survey infographics, tables, and analysis diagrams. The aim of this paper is to collect, generate, and record information on the evolution, history, vernacular architecture style, and heritage architecture of Saidpur and, promote and present data for further heritage conservation and protection work in Saidpur.

Keywords: architecture, heritage, vernacular, history, urban growth, architectural analysis, architecture drawings

INTRODUCTION

This research is based on one of the oldest villages of the ancient subcontinent region with the significance of cultural heritage. Followed by contextual studies, this study has dissected and analysed the history, culture, vernacular construction materials and style, heritage, urban growth and patterns, and architectural elements of Saidpur dating back to 1500s. It has particularly focused on analysing architectural heritage in detail and present a case on its architectural features that are decaying on site. It has evaluated and recorded all the architectural information related to heritage buildings on site to formulate records on the old and present Saidpur and promote future preservation activities in Saidpur.

Major research direction for this study was through primary research. Since there were no proper or substantial records, data, drawings, maps, or any other information found on Saidpur, it was important to generate a study that would focus on Saidpur's multi-cultural significance, history, current situation, and future scope. This was the most challenging aspect of the research where all the data was to be researched, collected, organised and

tested for authenticity through primary research. The timeline of Saidpur was researched to dissect how civilization started in Saidpur and resulted in the village to be known as one of the main pilgrim centres in past. The old and current construction methods and styles of the village were researched, inspected and discussed. Heritage buildings on site were analysed, sketched, and reviewed in detail to generate and preserve its historical background, architectural details, and construction style. In addition, the case was presented on current condition of decaying heritage on site, to promote protection and promotional activities for this ancient village.

Data was collected through formal and informal interviews in which native and temporary residents of Saidpur, Capital Development Authority (CDA) officials, other government officials and tour guides were addressed. The process also included multiple surveys. This study further continued with multiple site visits to collect data through onsite observations and gather the facts available onsite. By visiting each house and building in Saidpur, data concerning a demographic study, Saidpur's architectural timeline study, urban crawl, and pattern of Saidpur, was collected and authenticated. Heritage buildings were studied with respect

to their materials, construction methods and style, history, details, originality, and other aspects. Satellite maps were also examined to further reinforce the study. This research also included secondary research where available texts were studied for confirmation of the information collected through primary means. A small number of records that were available and related to an old demographic study of Islamabad and Saidpur under municipal authorities were also gathered, studied, summarized, and represented.

SAIDPUR

Saidpur in located at the foothill of Margalla Mountains, in the suburbs of the capital of Pakistan, Islamabad. It is connected via one of the main roads (margalla road) in Islamabad. Saidpur used to have a connection to the old city of Rawalpindi (that is still known as Saidpur Road today) in the past. Saidpur has a contoured landscape and is surrounded by Margalla Hills that elevate up to 1600 m. Saidpur has a total population of 8437 where 58% of the population are permanent residents who have inherited this place from their ancestors. Most of the population is employed as labour, drivers, shopkeepers, and private or government employees. In the past, people of this region mostly used to engage in cattle farming, gardening, farming, pottery and used to earn their lives through these means. Although Saidpur lies in the Capital Territory area of Pakistan, the most popular language spoken here is Punjabi, a national language of Punjab that is found in the neighbourhood of Islamabad. Further studies are summarized in Fig. 2.
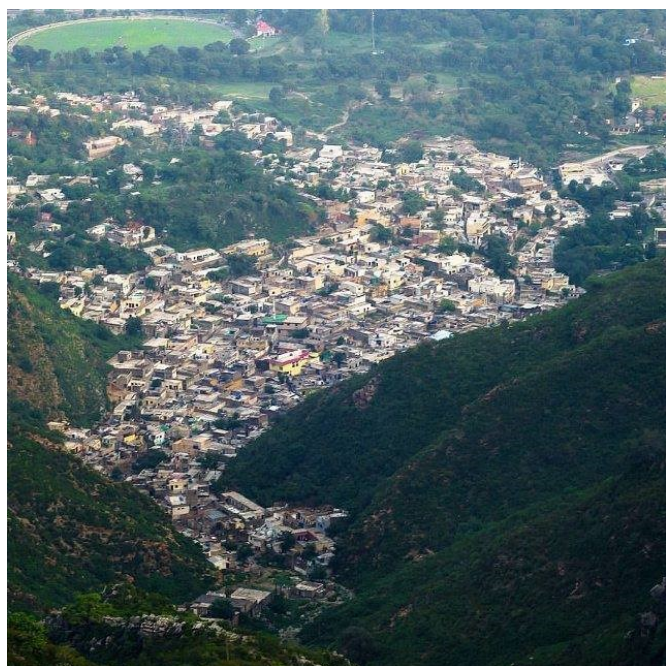

Fig. 1. The village landscape. (Source: PakiHolic, 2017)

Early history and evolution

Saidpur is estimated to have once housed Greek, Gandara, and Buddhist civilizations. The earliest history records for Saidpur date back to around late 1500s A.D., when Mirza Fateh Ali from the Mughal dynasty founded the village and named it Fatehpur Baoli (Mushtaq, 2018). It has also been a famous travelling route since the Mughal era. While traveling across the subcontinent region, travellers used to pass by Saidpur. Dates were a common snack of that time and travellers used to throw away dates seeds along the way which in result gave growth to numerous date trees in the area. Saidpur has been home to streams, mountains,

and greenspace since the beginning and its natural beauty has always been a fascination for people. The village was handed over to Said Khan Gakhar by Akbar after the former's family's services in the war effort against Sher Shah Suri. As a result, the settlement was renamed to 'Saidpur'. Sultan Said Khan was the son of Sultan Sarang Khan, a chief of the Pothar area during the Mughal Emperor Babur's period. In those times, there were three pilgrim sites in the Pothar region for Hindus and Saidpur was one of them.

In Mughal Times (1500s-1800s), during a tour, a Hindu commander named Raja Man Singh visited Saidpur and got inspired by its natural scenery. He offered building a Hindu temple in Saidpur and bore all its construction's cost. This temple was called Ram Kund Mandir. Four ponds were also built that have been demolished by now. Saidpur was previously a garden resort for a Mughal emperor Jahangir and it also became a prestigious religious centre later. Hindus from Rawalpindi and other regions used to gather around this place to celebrate their festival of Baisakhi every year. Jahangir has also mentioned the Saidpur village in his autobiography 'Tuzk-e-Jahangiri' (Mushtaq, 2018). He commented on his stay and referred to this village as a 'place beyond Rawalpindi' (Mushtaq, 2018). It has also been mentioned in several gazettes and other old articles. Said Khan gifted this place to his daughter who was married to the Mughal emperor Jahangir, son of the Mughal emperor Akbar.

In Colonial or British era (1858-1947), as Saidpur started to expand, people from other religions also started to move to this place. In 1800s, a Sikh temple and Dharamsala was built opposite and adjacent to the Hindu temple. Before the partition of the subcontinent, Sikh's Waheguru, and Hindu Goddesses (Lakshmi and Kali) resided side by side. A mosque was also built later for a Muslim community. An old shrine of Zinda Pir (three hundred years old) also existed there. Saidpur soon became a multi-cultural hub catering multiple religions and cultures. At one node, temples for three different religions were erected. These temples displayed religious concepts of arts and architecture amongst different religious communities, vernacular and traditional architectural style of the era and region, and crafting skills of natives with intricate detailing on façades. It was an anchoring point for three completely diverse cultures and religions. People kept renovating and extending these buildings as per need. For paving courtyard of the Hindu and Sikh temples, people from all over Rawalpindi contributed for marble and thus, it was paved over the years. Names of some of the contributors are still present engraved on marble present on site.

After the partition (1947-1970s), Hindus and Sikhs fled to the Indian part of the subcontinent. They took their brass made statues and left the temples abandoned. They took their customs and practices with them but left their architectural legacy in Saidpur. In 1967, Islamabad was declared the capital of Pakistan and Saidpur was made part of Islamabad (sector f). Roads were constructed and paved, and more people started to move to the Saidpur region. In 1980s-1990s, Saidpur once again acquired the status of a separate village granted by the government. It was no longer the part of the Islamabad Capital Territory then. By that time, roads were constructed and both interest in and demand for housing in Saidpur remained the same as it was just in the neighbourhood of Islamabad. By this time, Saidpur gained people's attention because of its natural beauty and architectural heritage. Dharamshala was later converted into a school and Gurdwara and Haveli into office buildings. In 2005, CDA took the initiative of converting Saidpur into a tourist village and preserving old buildings for public display. Temples were held vacant and Dharamshala was converted into a gallery. By this time all the ponds and landscape heritage were gone as CDA hardscaped them into the use for restaurant's outdoor seating. Old temples

were covered with decorative motifs that were not true to the temples' heritage. New constructions, resembling old buildings, were built and today one cannot distinguish between what is old and what is new. This renovation was not a proper renewal that should have preserved tangible and non-tangible heritage of Saidpur. It conveyed misleading information and ornamentations on old building's façades and created confusion amongst new and old vernacular constructions in Saidpur. Instead of preserving, this activity damaged Saidpur's heritage and architecture. In 2010-2020, the restorations and measures taken were inadequate to protect Saidpur's heritage and keep the village growing. Its heritage started facing vandalism and is in a bad state today. It urgently needs uplifting and protection strategies.
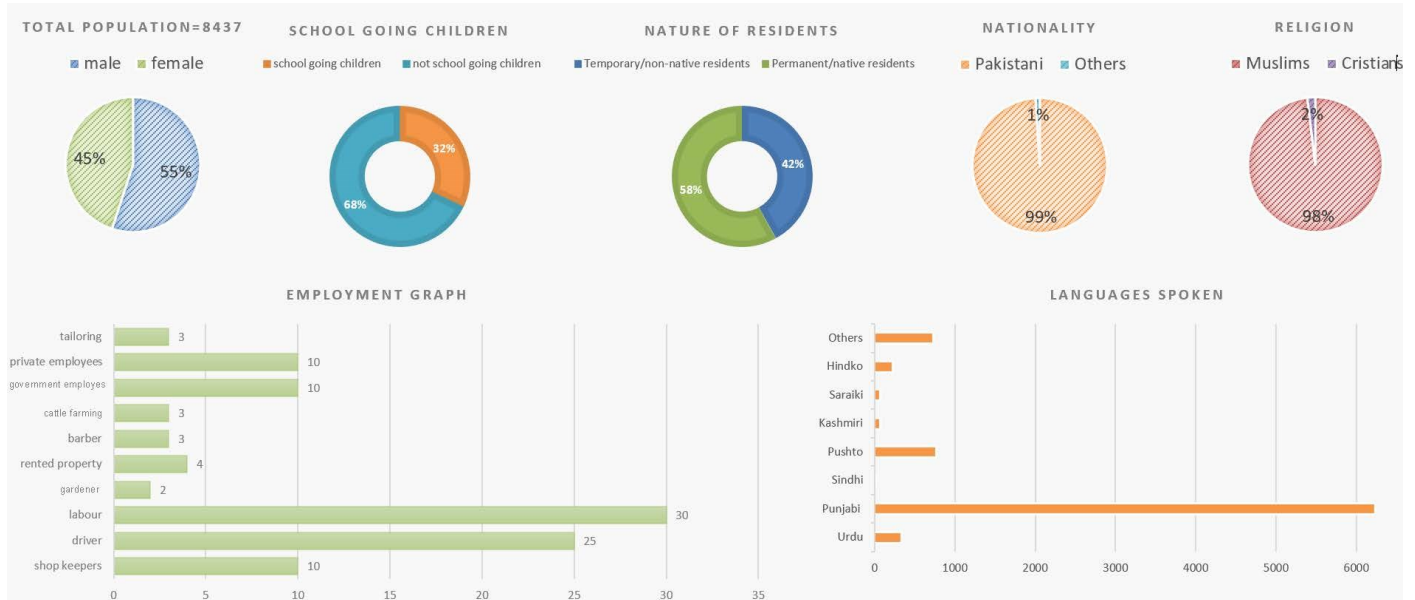

Fig. 2. Ethnographic study of Saidpur. (Source: Ramsha Nazir Malik)

Fig. 3. Saidpur's timeline collected from CDA archives, interviews, via primary and secondary research. (Source: Ramsha Nazir Malik)
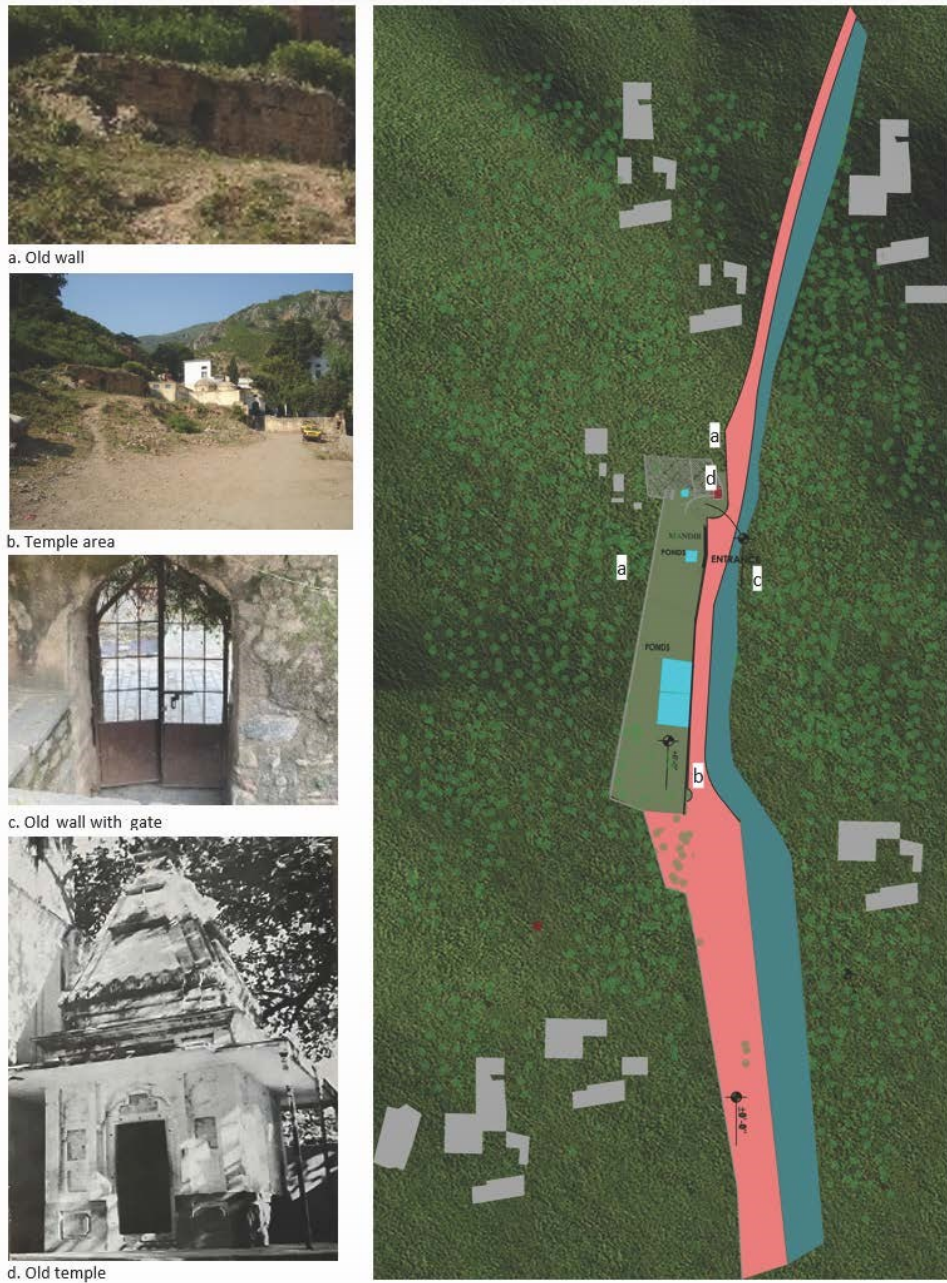
Fig. 4. Saidpur's mapping of 1500s-1800s, data collected by interviews, from CDA archives and site study. (Source: Ramsha Nazir Malik)

Fig. 5. Saidpur in 1960s, data collected by site research and CDA. (Photos: CDA)

Tab. 1. Demographic study, data collected by interviews and records from the Pakistan Bureau of Statistics. (Source: Ramsha Nazir Malik)

Years	Total Population	Total Households
1970s	500	150
1990s	7421	1195
1980s	3839	500
2010s	8437	2200

Growth pattern, culture and traditions

Since 1600, Saidpur has grown from a famous landscape spot to a clustered village. It started to grow around the religious buildings and soon got spread throughout the valley. Houses made of vernacular materials such as stone, mud and even bricks were built. A pathway to access the village crossed it from the centre along with a stream that brought water from hills to land to cultivate the farms and gardens. Saidpur is a small village, and as per land, it has grown to its maximum limits in terms of population and construction. To curb the expansion, the government decided to keep these parameters the same for the upcoming years. Fig. 6 represents the growth during the years: 1500s-1800s, 1858-1947, 1947-1970s, 1980s-1990s, 2000-2010 and 2010-2020. As people started to inhabit Saidpur, they brought culture, arts, folklore, architecture, traditions, customs, and their beliefs with them. It became known for being a garden resort with streams, mountains, gardens, cattle farming, temples, folklore, pottery work etc. Its constructions were mostly built with vernacular local materials from nearby areas.

Today Saidpur lies in shambles. Where its landscape heritage has almost been lost, its architectural and cultural heritage is also under threat. Potters are left unrecognized, new buildings are being constructed over old ones, old temples are deteriorating, urban and spatial planning is in chaos, old streams are being converted into trash dumping sites with its water channelled through pipes, ponds have been hardscaped and built over, folklore, cattle farms are vanishing and artisanship is also dissipating as there is no proper place for its display and educational exchange. It is essential to recognize the culture and heritage of this place and preserve them before they will have decayed completely. It is important to inculcate conservation, protection, and preservation theories combined with concepts such as rural regeneration or architectural puncture on people, in order to preserve, highlight and promote the heritage of Saidpur the way it should have been.

BUILDING TYPOLOGIES AND CONSTRUCTION STYLE OF SAIDPUR THROUGH AGES

From a clutter of a few houses, Saidpur grew into a packed, walled to walled, and cluster-phobic village. Saidpur's streets started to resemble other streets of old historic cities of the subcontinent such as inner (androon) Rawalpindi. Today, while walking on these streets, a play of light and shadow through hanging shades and varied heighted buildings, textured streets, narrow walkways, and historic and vernacular constructions in the streets, give a unique user experience. The analysis in Fig. 9 further breaks down these experiences and inner view of the streets.

Since early history, construction in Saidpur has utilised stone and mud, where stone is used as a base to level the ground and then further used for walls, with a lime and mud mortar for binding. At times, brick walls can also be seen. These can then be coated with the lime and mud mortar. For roofing, mostly brick is used in layers with wooden or steel bars to support the weight of bricks. These again, can be coated with the lime and mud mortar for extra strength and temperature resilience. For most of the structures, these construction methods and materials were used and were native to the region. Brick was not readily available in the Saidpur region in old times but was transported from other areas around. For temporary constructions, tree branches, grass and leaves were also used to make sheds for the houses. As time passed by, concrete also became part of Saidpur's construction, but these structures are less popular.

People still follow old materials and styles mostly as it is a more economical and faster way of construction and the materials are also abundantly available nearby. The analysis in Fig. 12 shows the timeline and breakdown of architectural elements and construction styles in Saidpur through different ages. Saidpur's settlements have a historic and progressive record that was built through ages. Most of the people belonged to the Gakhar cast and they are still living here as natives of Saidpur. People built their religious, institutional, and other buildings. Saidpur became a unique node of concentration where in one radial, multiple religions and cultures were co-living. Site research showed that constructions dating back to 1860 and even earlier years, are still present along the main road of Saidpur. This road is also the oldest route to Saidpur and has been paved for easy access.

In the centre of Saidpur, there is a main node in which all the temples and heritage are located. This is the point from where civilization in Saidpur began and spread throughout the valley. It serves as the main hub and focal point of Saidpur. Here, one could hear the prayer calls from the Mosque, and bells and melodies from Hindu and Sikh temples, all at once. In one perspective, domes and minarets emerging from the Mosque and temples could be seen in a hierarchy. These three cultures along with Christianity have lived together in the subcontinent for long and thus Saidpur was an ideal representative of the multi-cultural and diverse subcontinent. For some of their religious buildings, even courtyards or landscapes were shared, yet people used to make their offerings peacefully in their respective temples. Saidpur became one of the main pilgrims' centres of the region and has also been mentioned in articles, papers, books that were written in past times. This aspect of Saidpur where multi-architectural and cultural heritage exist in one node, is unique and has gained Saidpur popularity in the region of Pakistan. The node is a main focus of tourist attraction today, in national and international terms, a hub where people come to witness marvels and art of the past. These mainly include the Heritage Hindu temple, Sikh temple with Dharamsala, Mosque and Haveli.

An old gate situated in the node was used to enter the temples in the past. It is still operational but visitors use other entrances to enter the holy places today. It is made of stone and brick and has an old wall, still intact. The wall is constructed of medium sized stones with the lime and mud mortar used as the binder. It is said that there used to be underground rooms, entrances, and water storages as well in this area but these have been closed or demolished by now. The main courtyard is shared by the two temples and Dharamsala. There is also an old tree still intact onsite, giving shade to the central courtyard. Around the courtyard, there are stairs and platforms with marble. The marble was donated by villagers and people from other areas and their names can be found engraved on some pieces. Hence, the landscape and stairs around these buildings were completed progressively, as people were able to contribute for the work. Unfortunately, some of these structures were damaged in the renewal of the courtyard in 2022. The following sections will discuss architectural elements of each heritage building existing in this node separately.
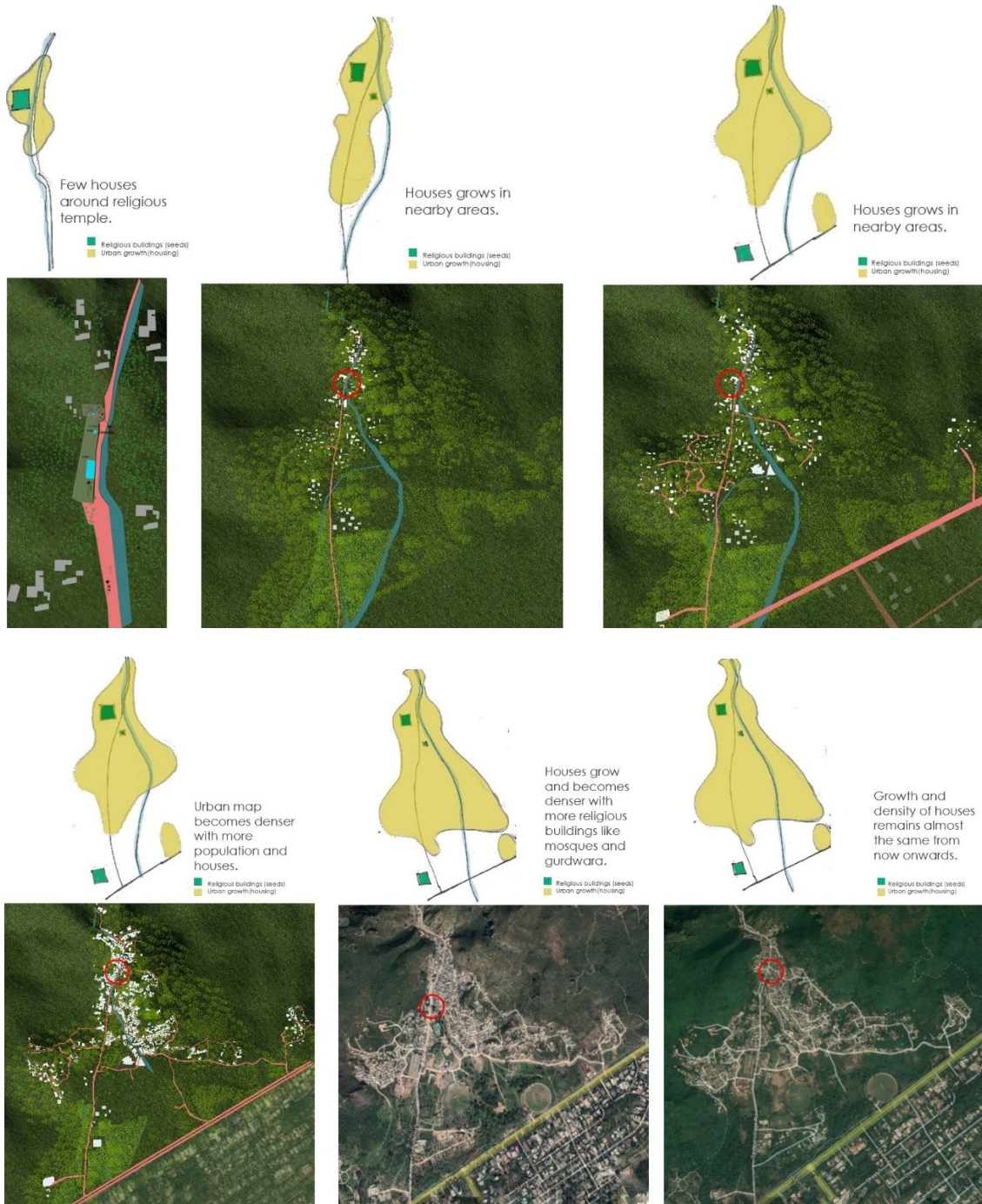
Fig. 6. Growth pattern of Saidpur collected through site study, Google maps records and interviews. (Source: Ramsha Nazir Malik)
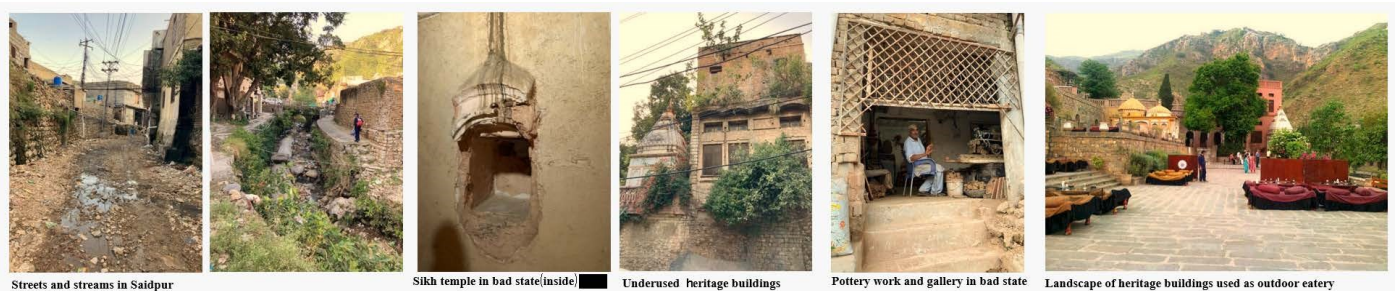

Streets and streams in Saidpur — Sikh temple in bad state(inside) — Underused heritage buildings — Pottery work and gallery in bad state — Landscape of heritage buildings used as outdoor eatery

Fig. 7. Current situation of Saidpur. (Source: Ramsha Nazir Malik)
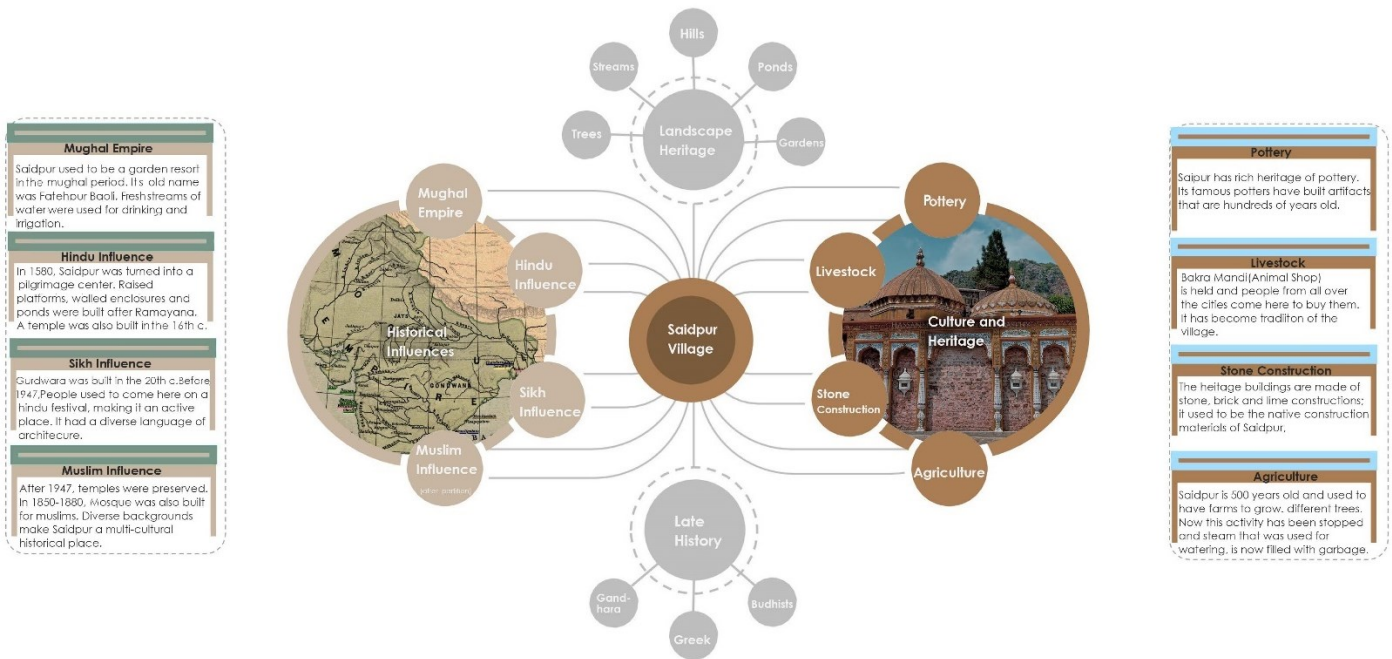
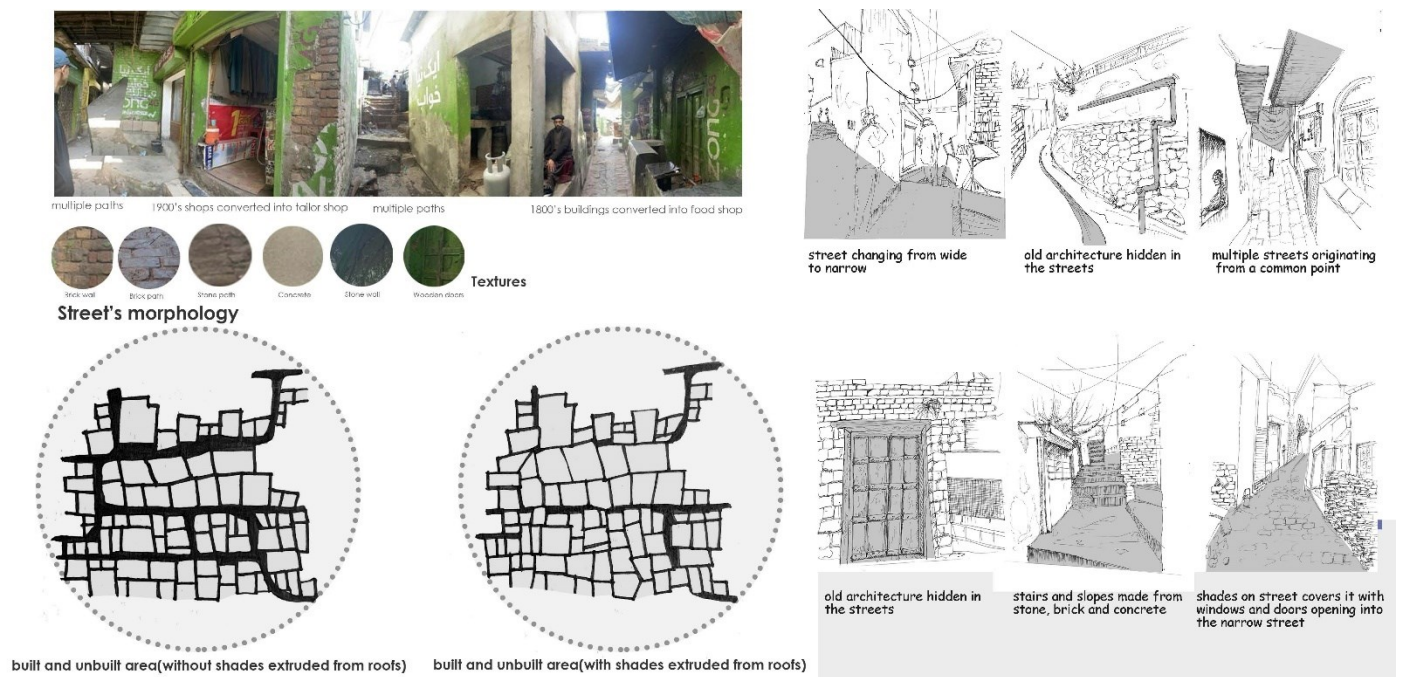**Fig. 8.** Culture and traditions of Saidpur. (Source: Ramsha Nazir Malik)

Fig. 9. Street morphology of Saidpur. (Source: Ramsha Nazir Malik)

Fig. 10. Street colors and textures, and buildings' morphology of Saidpur. (Source: Ramsha Nazir Malik)

Fig. 11. A typical street layout and house plans in Saidpur, morphology of Saidpur. (Source: Ramsha Nazir Malik)
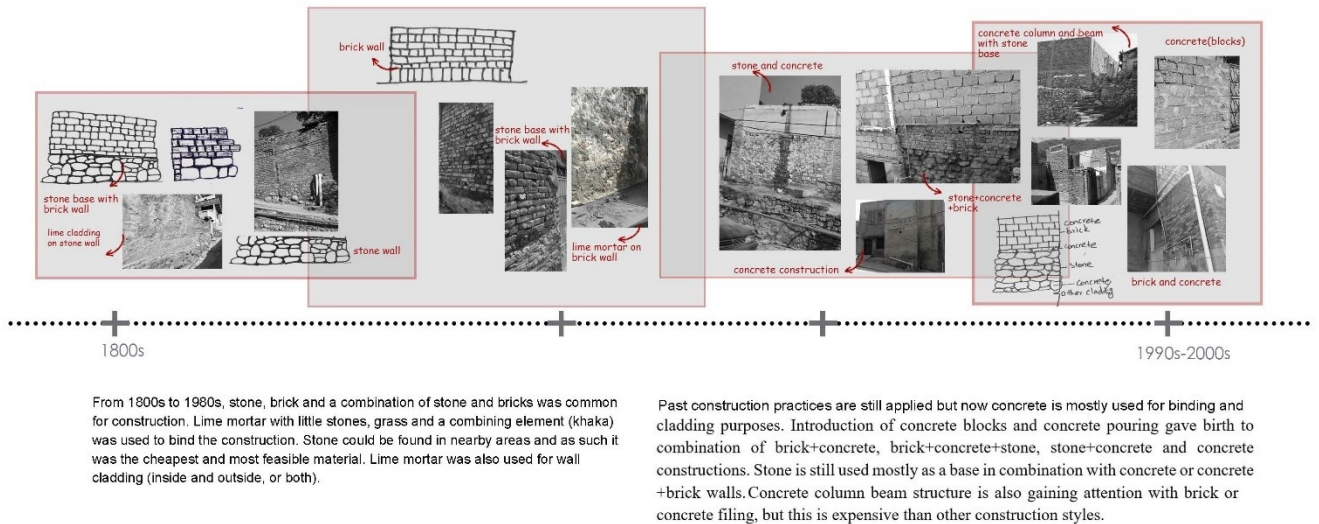

From 1800s to 1980s, stone, brick and a combination of stone and bricks was common for construction. Lime mortar with little stones, grass and a combining element (khaka) was used to bind the construction. Stone could be found in nearby areas and as such it was the cheapest and most feasible material. Lime mortar was also used for wall cladding (inside and outside, or both).

Past construction practices are still applied but now concrete is mostly used for binding and cladding purposes. Introduction of concrete blocks and concrete pouring gave birth to combination of brick+concrete, brick+concrete+stone, stone+concrete and concrete constructions. Stone is still used mostly as a base in combination with concrete or concrete +brick walls. Concrete column beam structure is also gaining attention with brick or concrete filing, but this is expensive than other construction styles.

Fig. 12. Wall constructions. (Source: Ramsha Nazir Malik)

Brick roofs with iron strips were used. Some also used I-beam for additional support. At times, wooden bars were also used for support.
Grass roofs with tree branches were also used in temporary constructions.

The same style as in 1800s is used. Decorative bricks were also in common use.

The same style as in 1800s is seen. Tin structures as temporary or Kacha structures were also common with stone as weight to fight against air pressures.

All the styles and methods used in past are still there. Brick roofs are still most used. Concrete roofs are the second most common style.

Fig. 13. Roof constructions. (Source: Ramsha Nazir Malik)
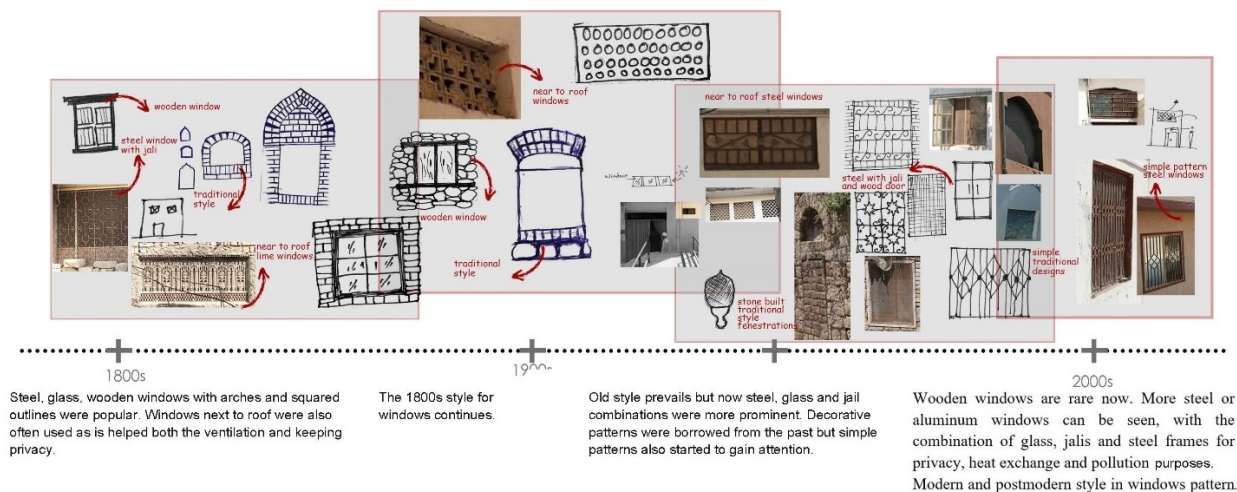
Fig. 14. Window constructions. (Source: Ramsha Nazir Malik)

Legend:
- 2020 onwards
- 2000-2019
- 1980-1999
- 1960-1979
- 1940-1959
- 1920-1939
- 1900-1919
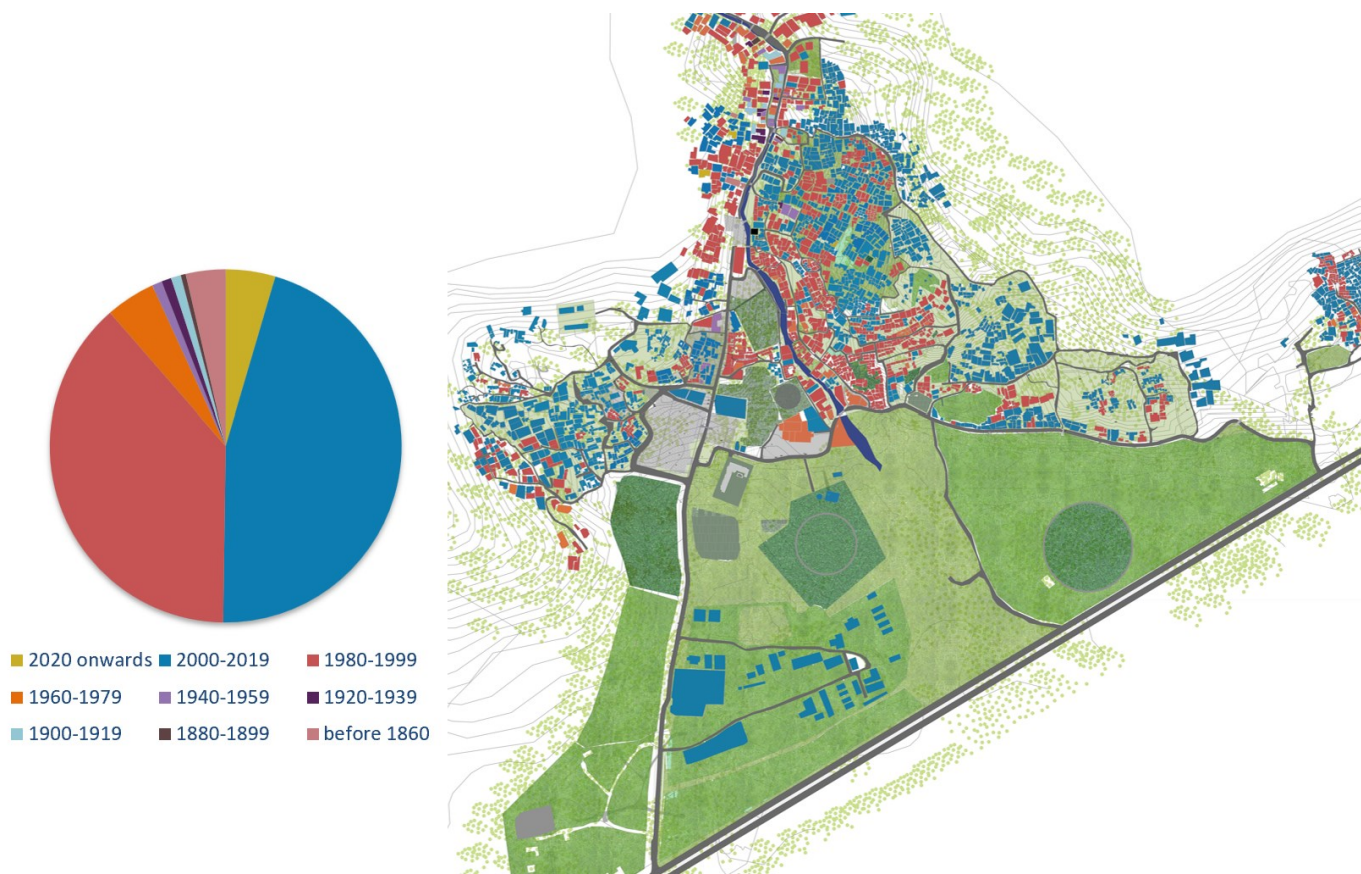- 1880-1899
- before 1860

Fig. 15. Saidpur's timeline of buildings constructed through various periods. (Source: Ramsha Nazir Malik)
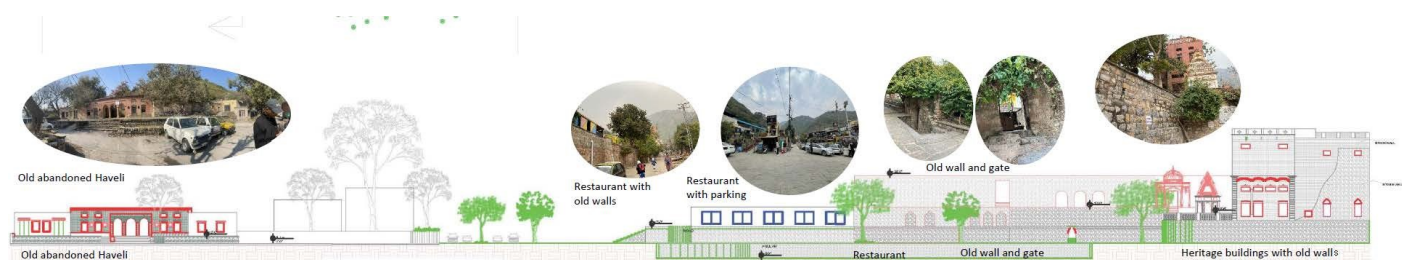

Fig. 16. Saidpur's section of main complex with religious and heritage buildings. (Source: Ramsha Nazir Malik)

Fig. 17. Heritage buildings in Saidpur. (Source: Ramsha Nazir Malik)

Fig. 18. Saidpur's main node with heritage temples and Dharamsala, with old entrance gate. (Source: Ramsha Nazir Malik)

The Ram Kund temple as a religious centre for Hindus

The Ram Kund temple is a Hindu temple that is estimated to have been built in the 16th century by the financial aid of a Hindu commander, Raja Man Singh. This temple is a small, squared room with arched niches made for the sitting of statues of Hindu Gods. Ram Kund used to be one of the main temples for Hindus in the old days. It is said to have been built to commemorate God Rama who Hindus believed lived with his family in this region for 14 years. According to official records dating back to 1893, a fair was held each year at a pond near the site called "Ram Kund" to commemorate that Ram and his family had once sipped water from it. For centuries, Hindus have travelled to worship the deity at

this temple. Since it was built in the pre-partition times, Hindus from different areas used to come to the place to make their religious offerings and obligations. During the partition, as Hindus migrated to India, they took the idols with them and abandoned the temple.

The Ram Kund temple is built within the 'language' of temples of subcontinent. It has its originality and is a dominant structure, but the scale of the building is small in terms of square footage. It is a piece of art built with stone and mud or lime construction. Its walls are made of medium sized regular patterned stones with mud and lime used as mortar for binding. The same mortar was used to clad the walls and other surfaces for finishing. Details and

motifs are also made of this mortar or stonework. The Kalasha or peak of the roofs were ruined but were built later as a replica of the original temple. These have some intricate details and the shape and morphology are similar to other old temples around Rawalpindi, Lahore and other regions of the subcontinent that were built around the same time. Similarly, other motifs and details on façades and roof are coherent with the temple language of the region of that time. Roof construction is yet unknown but it is made either from stone or brick. The construction and details depict that it is an art of hand work with features often seen in other temples around the subcontinent. The roof design is also typical for the subcontinent and forms progressive multiple layers in a different scale but following the same design and patterns.

Fig. 19. Kashi Vishwanath Mandir. (Photo: Great Republic, 2022)
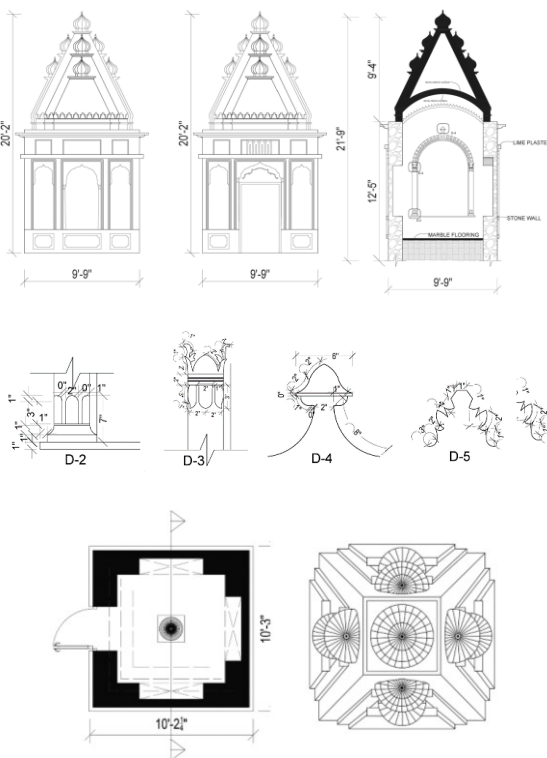
Fig. 20. Ram Kund temple. Above: Temple elevations and section. Middle: Temple details. Below: Temple plans. (Source: Ramsha Nazir Malik)

Fig. 21. False ornamentations on the Ram Kund temple today. (Source: Ramsha Nazir Malik)

As outlined above, remaining claddings on the façade, literature and interviews have revealed that the Ram Kund temple was cladded with the lime mortar in the past. This was used for binding, strength, finishing, and temperature control. The flooring of the temple is marble and is said to be in its original state but according to research, it might not be true. Similar is the case with marble on outer façades and inner decorative tiles. Today, the façades and interior have been whitewashed and coated with white paint and false, decorative ornamentations. These ornamentations are in sharp bright colours that are painted over the motifs on façades. Furthermore, the interior has also been painted with floral patterns and designs. The ornamentations are not original and have been used just to catch the eye of tourists. This temple deserves better strategies for renovations, adaptive reuse, and heritage protection, which are embedded in the restoration laws rather than turning beautiful original materials and details on façades into coated white walls with 'fancy' patterns and colours.

Fig. 22. Ram Kund Mela. (Photo: K. D. Maini, 2022)

Landscape outside the temple used to had courtyards, trees, artificial ponds or water storage tanks, stairs with the backdrop of the Margalla Mountains and fresh streams running from them. The apron of the temple was used for taking prasad and the ponds were used for rituals of Hindu community and were built along with the temple. They also had proper water inlet or outlet underground mechanisms. All these have either been destroyed by global warming and lack of care or demolished and hardscaped into a restaurant's patio. Although the traces cannot be seen today, according to records, a flowing figure shows where

they used to be. The layout of ponds and temple resembled the layout of other temples across the subcontinent region. The Ram Kund temple in India displays the formation of ponds and stairs in a similar style to Saidpur's Ram Kund temple. It is not guaranteed where these ponds were situated and how they looked like but from interviews with the locals, their former position is estimated in the territory of what serves as a Des Pardes restaurant today. Estimated locations of the ponds was shown in Fig. 5.

Sikh Temple: Gurdwara Singh Sahaba

Opposite the Hindu temple, there is a gurdwara which was built in 20th century. After the partition, the Gurdwara had been in use as office premises. Like other heritage structure in Saidpur, the Gurdwara is also made of stone with the lime mortar binder. It used to have lime cladding on walls. It is said that there existed paintings and photographs in the interior which were destroyed in whitewashes.
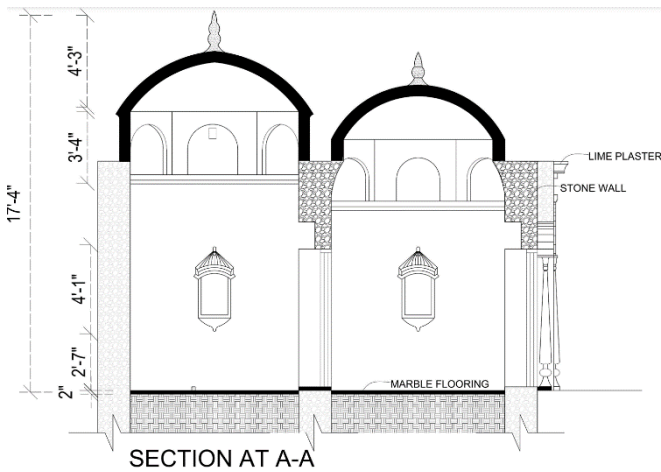
Fig. 23. On-site section of Gurdwara. (Source: Ramsha Nazir Malik)

This Gurdwara is a rectangular small-scale building that is divided into two squared interconnected rooms from inside. It is said that there is an underground space beneath the Gurdwara that has been closed during renovations. It has two different sized domes where the dome at the entrance is smaller in size and height than the main dome. Niches and grandeur of the second room suggest that it used to be the main room where Guru would be placed on a high platform and where major religious offerings and rituals would take place. As seen in other gurdwaras of similar style and period, it also features projections, projected roofs, domes, heighted windows, niches, and arches that are architectural elements typical of gurdwaras. Like the Gurdwara Holgarh Sahib, this temple also has one entrance led by stairs and, niches and windows on the other side of walls. Like Gurdwara Datan Sahib, this temple is composed of two rooms directly connected to each other without any door or passage. Today, as other structures on the site, this Gurdwara has also been whitewashed and covered in bright paints. Its inner walls are deteriorating and architectural elements such as niches to hold oil lamps, ceiling windows (roshan daan), and arches are de-shaping.

Dharamsala is a building located right next to the Gurdwara. Its purpose of formation and construction date are controversial: as some people say it was built with the Gurdwara for teaching of Guru Nanak, and some say it was built with the Hindu temple as a rest place for travellers. Dharamsala is a Sanskrit word and it is a place where Sikhs meet to praise the Lord and to discuss common matters. According to research, architecture and planning of temples suggests that it was built along with the Gurdwara in the

20th century. It was built to house visitors, give them food (langar) and for some other purposes. The food and help provided to these travellers was usually given by the villagers. Extensions of the temple were conducted to increase the numbers of rooms as necessary over the time. Later, after the partition, it was used as a school. After 2005 Dharamsala was converted into a gallery with old photographs of Saidpur and Islamabad and other rooms were converted into offices or spaces for people hired by CDA for the maintenance of Saidpur village.
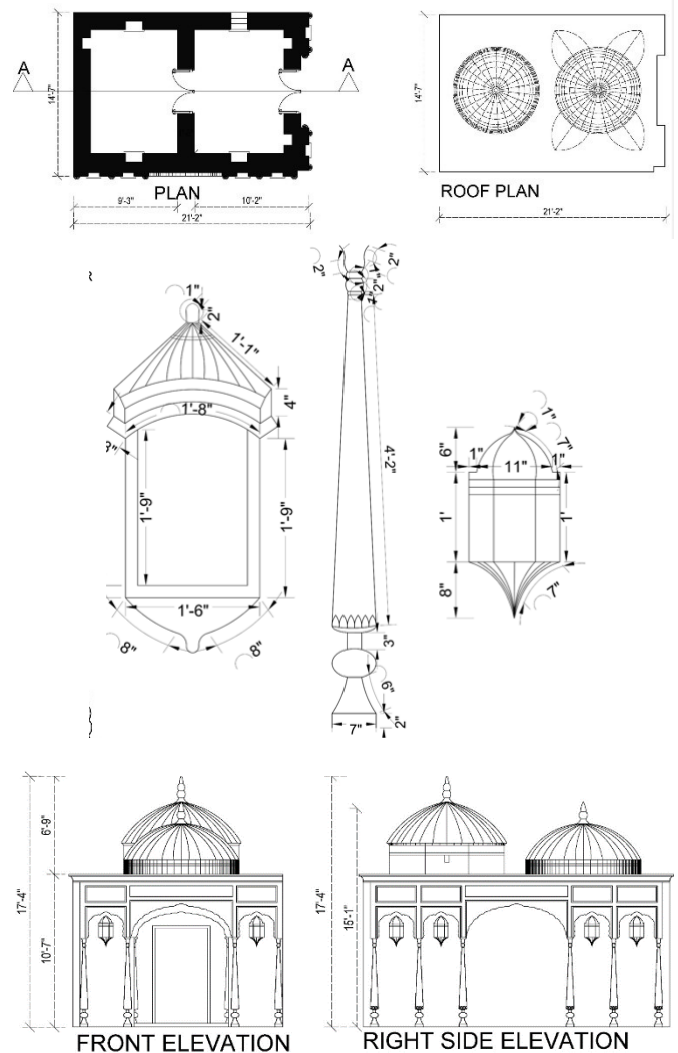

Fig. 24. Gurdwara Singh Sahaba: Above: plans. Middle: On-site details. Below: On-site elevations. (Source: Ramsha Nazir Malik)

Windows and niches built in the interior of the building have three-pointed arches and pseudo three-centred arches. This part is in the middle and is built of stone walls that are around 1-2 feet thick. The exterior was originally cladded with the lime mortar and so was interior of the building. The roof of this original part of Dharamsala is built of bricks placed in arches with iron or metal girders supporting in between. The roof is a barrel-vaulted ceiling, and this typology of roofing gives a long-span spacious interior without any columns or structure obstructions in between. Thick wooden bars are said to be installed later to support the roof. Heighted ceilings, arched windows, and heighted windows on lofty heights of the wall are common features of old styled buildings of this era. Such architecture is usually inspired by the Mughal style. These allow ventilation, good air circulation, and light inlet installation and keep the interior cool and airy letting warm air stay closer to roof at a heighted distance from the floor. The right, left, and upper constructions along with the hallways

along three sides of the building are add-ons to the building, which were extended later in the past. Similarly, patterned brick boundaries on roofs with brick flooring were also added later.

Where the original part is made of stone, extensions are mostly built of brick. They have simple square windows and pointed cinquefoil arches. The roofing also follows similar construction style as that of Dharamsala and is a flat roof made of brick work. These extensions had brick façade covered in white paint before 2006 but were in the original state and revealed their true colour and formation before being painted. In 2005 renovations, true materials and construction were revealed by scraping off all the paint from the façades of Dharamsala. Some part of the buildings (left first floor wing), that was built in 1900s has been demolished by today. These extensions along with the original part were today painted in a reddish tone to match the colour of the bricks. The inner side of the hallways and the walls have been decorated with floral patterns that are mere ornamentations and do not do justice to the building's original features and façades. It conveys misleading information about culture in the past and covers the original façade with bright floral patterns.

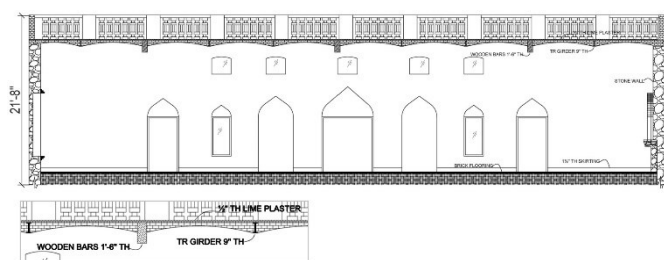**Fig. 25.** Interior of Dharamsala. (Photo: Ramsha Nazir Malik)

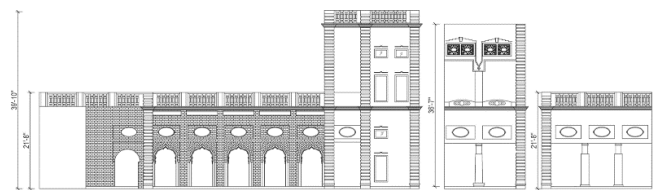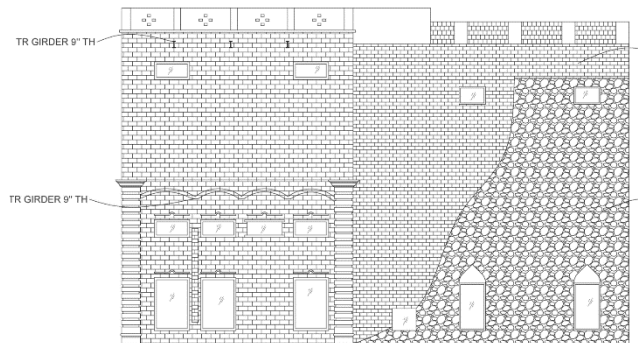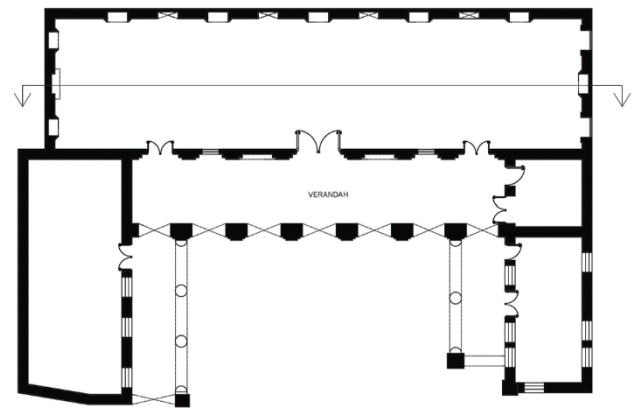**Fig. 26.** Section of Dharamsala with details. (Source: Ramsha Nazir Malik)

Fig. 27. Dharamsala: Above: Plan with extended wings. Middle: Right elevation showing change of materials. Below: Elevations of Dharamsala. (Source: Ramsha Nazir Malik)
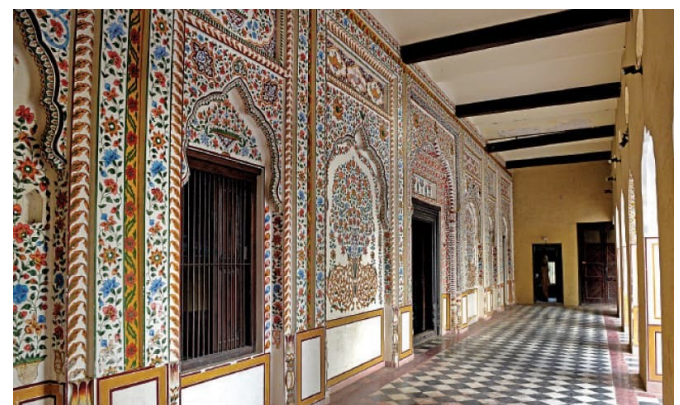

Fig. 28. The veranda renovated by the CDA. (Photo: Tanveer Shahzad; Source: Yasin, 2016)

Raajgan Haveli (Raajgan baithak)

This building was built in 1850-1880. As the collected data reveals, a Haveli was used as a bhetak, a place for people to sit and discuss their routine issues. It is constructed of brick and stone and used to have brick roofing with wooden bars for support. The Haveli used to have the lime cladding on the interior and exterior façades like other old buildings. Later, it was painted white and in 2006, CDA gave it a look of a brick building and scrapped off all the paint. It was painted red to match the brick look. The mixed stone and brick constructed walls of the Haveli also suggest that

in between today and the time when it was constructed, several works of constructions and renovations have been done on this building. This structure today stands as an abandoned, deteriorating building. It also has an extended, abandoned old structure on its right and another one on its left that was added later in 2006.

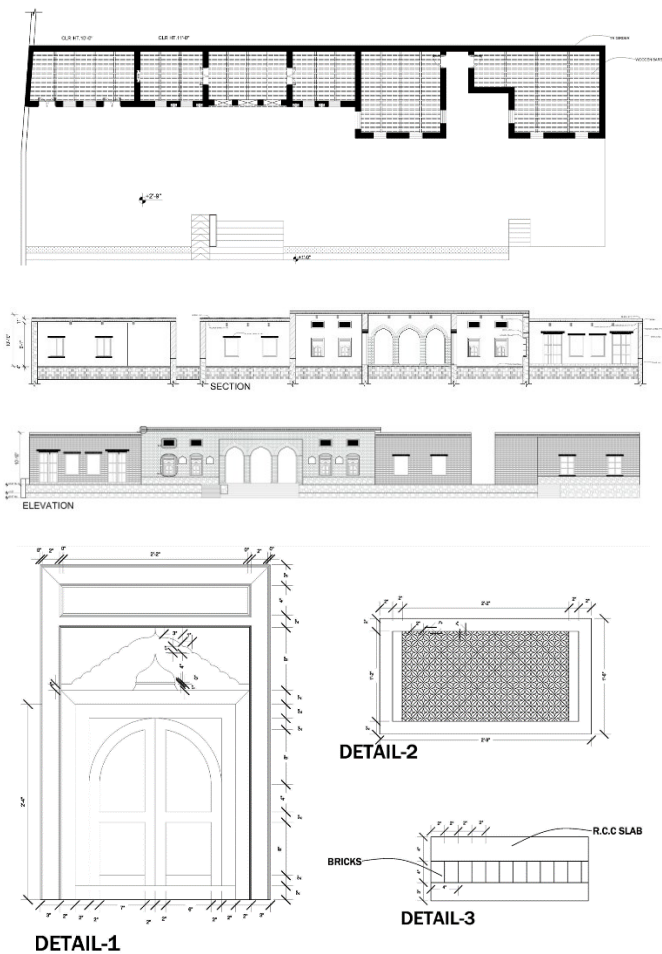**Fig. 29.** Old Haveli before renovation. (Photo: CDA)

Fig. 30. Haveli: Top: Plan. Middle: Section with details and front elevation of Haveli. Below: Details, (Source: Ramsha Nazir Malik)

The architectural elements seen in this building such as windows, arches, niches, skylights, are similar to other old buildings of Saidpur and also represent the typical style of Sikh and Hindu buildings of the subcontinent region. The niches were used to

hold oil lamps in the dark. This resembles the Mughal style buildings with the symmetry and balanced proportions and such structures are also found in the neighbouring regions such as Lahore, Rawalpindi, Peshawar, etc. All the landscaping around the Haveli was done later in 2006.

Mosque (Masjid)

As other religions and cultures started to settle in Saidpur, they needed structures to conduct their religious activities. It was in the late 1800s when the Muslim community of Saidpur built a mosque (masjid). It was a small-footprint, rectangular building initially. By following the construction methods of that time, it was also built with the stone walls and lime mortar. Likewise, its interior and exterior walls had lime cladding. The Mosque is a simple linear structure with plain façades. This structure was later extended to include a new wing. The newly added structure is clearly distinguishable from the old one and follows contemporary design. Patterns and designs seen a in architectural elements like jalis, parapet walls, windows etc. are like designs seen in other buildings in Saidpur of same time.

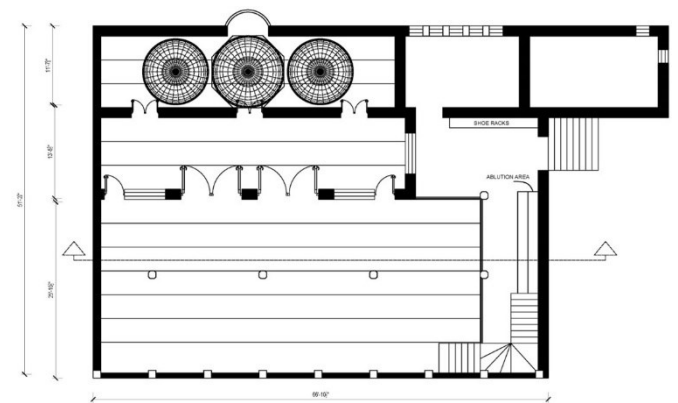**Fig. 31.** Old and new construction of Mosque. (Source: Ramsha Nazir Malik)

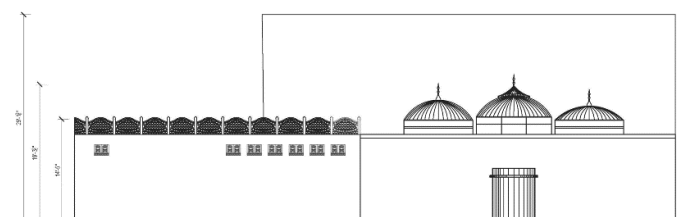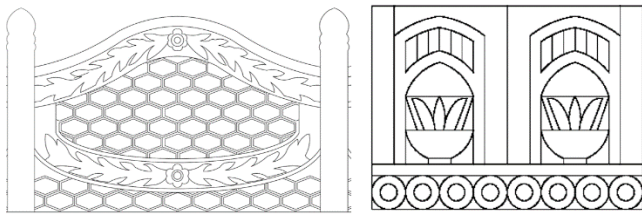**Fig. 32.** Plan of Mosque. (Source: Ramsha Nazir Malik)

Fig. 33 (caption opposite).

Fig. 33. Mosque: Top: Right elevation showing façade of old structure. Below: Architectural details. (Source: Ramsha Nazir Malik)

DISCUSSION AND CONCLUSION

This research describes in depth the architectural and contextual analysis of Saidpur with respect to Saidpur's heritage and history. As Saidpur is getting older with time, it is also losing its architectural heritage. In the name of renovations, façades are already painted with thick layers of paint, domes are decorated with false ornamentation, and original flooring was broken to floor new polished tiles. With no original records taken, interior walls and architectural elements are de-shaping, construction materials are decaying, and structures are turning into ruins. Before it completely loses its identity, it is important to analyse and preserve the records of this village for further actions. For example, in a Chinese village of Caizhai, a series of wooden pavilions revitalizes the village's cultural and historical heritage using the concept of architectural puncture. It rejuvenates the heritage by installing architectural interventions to highlight the context, history, and culture of the area. Similarly, 600 years old Gangtou village of China was rejuvenated as a prime destination for arts, culture, and heritage. It included preservation of traditional buildings and structures including ancestral temples, ancient bridges, and houses and thus, making it an 'open-air museum of Lingnan architecture'. These studies can be explored in depth and similar strategies could be applied in Saidpur to protect and present its cultural and architectural heritage features.

This paper has summarized urban growth of Saidpur through past historical eras. It has also discussed historical and vernacular account of Saidpur with the emphasis on architectural heritage. Through multiple research methods, Saidpur's context, culture, significant features, and demography were recorded first hand. Records and historical timeline of Saidpur were generated to study its evolution. Similarly, cultural, and historical buildings were recorded and preserved through drawings etc. The investigation brought forward the miserable state of Saidpur that seeks help. This paper intends to preserve and promote the records of original architectural heritage of the village, depict the disappointing state of Saidpur's heritage and raise hopes for protection activities in the future.

Acknowledgements

References

Great Republic (2022) 'Kashi Vishwanath Mandir, Varanasi', Great Republic. [online] Available at: https://greatrepublic.in/kashi-vishwanath-mandir-varanasi/

PakiHolic (2017) '17 Stunning Pictures and Interesting Facts About Saidpur Village, Islamabad.', Paki Holic. [online] Available at: https://paki-holic.com/pictures-interesting-facts-saidpur-village-islamabad/

Maini, K. D. (2022) 'Ramkund mela', Daily Excelsior. [online] Available at: https://www.dailyexcelsior.com/ramkund-mela/

Mushtaq, G. (2018) 'The historical Saidpur village', Daily Times. [online] Available at: https://dailytimes.com.pk/232393/the-historical-saidpur-village/

Yasin, A. (2016) 'Tourists, restaurant violate sanctity of Saidpur's temple', Dawn. [online] Available at: https://www.dawn.com/news/1289029

Augmented reality and tangible user interfaces as an extension of computational design tools

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Abstract: The paper envisions the use of Augmented Reality (AR) as an interactive and communication tool utilized in the architectural design research, education, and practice. It summarises the current knowledge and various applications of this immersive technology in both the theoretical and practical field and focuses on a particular type of the AR implementation – tangible user interfaces (TUI) – in a computational design context. The outcome of the research is an adaptation of the originally GRASS-GIS-powered Tangible Landscape tool into Grasshopper 3D environment, which is more accurate and suitable for the architectural design workflow with respect to 3D computation, algorithmic modelling and different scale management. The newly prototyped tool is reactive to the modifications of the physical model and projects the computed additional information on it in real time and thus can communicate with the designer or observer, which results in a more interactive, haptic man-machine interface. The projected and visualised data on the physical model are the outcome of the computing algorithm designed in Grasshopper that allows for a wide range of applications, including the visualisation of shadows and solar potential analysis and thus depicts the physical model in multiple dimensions. Furthermore, the article discusses the potential and further development of this tool as well as the possibilities of layering different AR technologies in the subsequent research.

Keywords: mixed reality, tangible landscape, augmented reality, virtual reality, computational design, modularity

INTRODUCTION

Tools of architecture have been naturally evolving hand in hand with technology advancements. More than half a century ago, the first tool of computational design was introduced in the automobile industry. This tool was created to fulfil the need to make the notation of smooth geometries, initially splines, more exact and accessible for vehicle designers and draftsmen. In the 1990s, spline modelling tools were included in the early computer-aided design (CAD) software inside its graphical user interface (GUI). Designers and architects could intuitively model complex, continuous curves and surfaces defined by parametric equations, simply by manipulating the control points with a mouse. Parametric representations of those geometries were automatically computed and rendered on a computer screen. (Carpo, 2014)

Simplification and automatization of conventional design processes using CAD tools quickly became an industry standard. Further development of their role in the design process exceeded the purpose of automatization of the conventional design and marked an era of computational design. Spline-modelling tools have dominated the past 20 years of architectural design aes-

thetics and created the today's mainstream parametric architecture trend. Nowadays, designers can access huge amounts of data and utilize complex computations like never before. Analytical and optimisation tools can inform and create guidelines for the design. Parametric tools and more autonomous, generative algorithms have potential to be used in the whole design process from form-finding to fabrication.

The research of possibilities offered by technological advancements and its implementation in the context of architectural design can have as great aesthetical and conceptual impact as the implementation of a simple spline-modelling tool. Embedding of data created in computational-design workflow into AR software and making them tangible in the physical world creates new interaction opportunities between computational design tools and designers. In this research, we explore how tools paired with innovative user interfaces beyond GUIs can yet again challenge the ways the future of design methods might look like with even closer human-machine cooperation.

SYNOPSIS OF DIFFERENT REALITIES' CONNOTATIONS

"Architecture begins with a drawing: this is a starting point for an object that constantly lacks the third dimension in all of its aspects, though it is part of architecture as a discipline, different from the act of building. As Robert Evans pointed out: Architects do not make buildings, they make drawings of buildings; the transformation of a drawing into the building is always a challenge." (Tichá, 2006, p. 67) Representations of future buildings were, and still are the primary task of architecture, whether these are 2D drawings, physical or digital models. There is a constant challenge in displaying the design in the most legible, natural and descriptive way, while overcoming problems of the latest tools available, such as rigidity and different scale of physical models, limiting 2D nature of drawings and screens, or still unnatural and too individual virtual reality headsets.

As Schnädelbach's research in this area was focused on the most natural blending of representations of flexible human social interactions with rigid physical spaces (Schnädelbach, 2007), a similar approach was already achieved in experiments blending physical and digital representations of the designed spaces to provide viewers with sufficient information in a more natural way (Kymäläinen, Siltanen, 2012). These older approaches still open paths for further research as current technology is swifter and more ubiquitous. Nevertheless, the terms and definitions for the blurred line between real and virtual are already almost 30 years old, as they emerged when the digital paradigm blossomed in architecture in the mid 1990s. In 1994, Milgram and Kishino proposed a diagram that incorporated all these ideas into one definition of virtuality continuum (Fig. 1). In their diagram, Milgram and Kishino placed real environment and virtual environment as two extreme opposites in the gradient of mixed reality (MR), which contains various "mixtures" of those aspects. It was an explanation of situations in which real elements may appear in a virtual environment to create an augmented virtuality (AV), or to place virtual objects in a real environment to create an augmented reality (AR). Both these terms have been often referred to as augmented reality, despite the differentiation between them. (Milgram, Kishino, 1994)
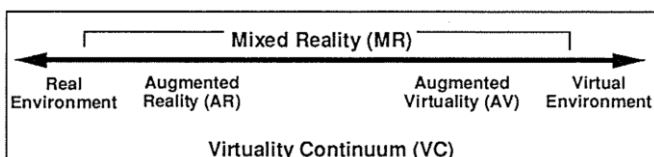

Fig. 1. Diagram of Virtuality Continuum. (Source: Milgram, Kishino, 1994)

In 2007, Schnabel, Xiangyu, Seichter and Kvan by developing the diagram of Milgram and Kishino, added the terms such as Amplified Reality, Mediated Reality and Virtualized reality. Amplified reality only amplifies the real properties of physical objects, instead of superimposing additional virtual properties on them, as is the case in augmented reality. The Mediated Reality deliberately diminishes the perception of reality, for example, by removing a collection of objects, which are then replaced with a more appropriate background image and adjusting the light and perspective – which are techniques usually used in architectural visualizations. Virtualized Reality virtualizes real-world scenes by capturing them from different angles and then reconstructing them in a computer as 3D scenes. The authors have placed these newly defined concepts on a similar spectrum of realities from real to virtual. (Schnabel, Xiangyu, Seichter, Kvan, 2007; Fig. 2)

In 2013, Steed, revisiting the Milgram and Kishino's taxonomy, stated that even within a "standard" virtual environment, there are often used links to the real world, as a result, what an observer sees in the virtual reality might reflect some aspects of the current state of the real world. This situation could be observed by means of using body avatars or real objects' representations in the complete virtual environment. These links to the real state of the world are built on the already experienced images from the real world and evoke similar connections and emotions. They are often used to make the virtual environment more familiar for the visitor, which simplifies the orientation and interactivity. (Steed, 2013) In 2022, Philipp A. Rauschnabel's research pointed out an ongoing confusion in the terminology. In his most recent paper on this topic, theoretical definitions are confronted with current industry practices. Rauschnabel acknowledges the ideas of Milgram and Kishino, resp. Schnabel and Seichter, along with various other viewpoints, labels their approach as "MR-centred view" and brings up its potential problems. He argues that AR and VR have opposing designer goals and user experiences, therefore cannot be united under one term. (Rauschnabel, 2022; Fig. 3)
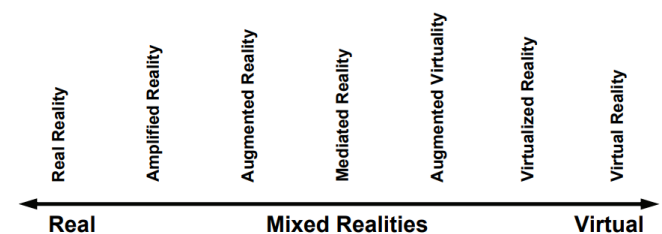

Fig. 2. Broadened spectrum of realities from real to virtual. (Source: Schnabel, Xiangyu, Seichter, Kvan, 2007)

The use of the term xRealities (XR) as an umbrella term for AR and VR was proposed, however, Rauschnabel cautioned about the interpretation of this abbreviation using the term "extended". VR is not by definition an extension of reality rather than a replacement of one. Instead, the interpretation of the letter "X" is proposed as a placeholder of either Virtual or Augmented (Fig. 4). This claim is backed by interviews with experts conducted as part of a study with the conclusion that XR users can either be situated in a physical space in which they can observe additional virtual augmentations or be immersed in another, virtual space separating users from perception of physical environment distractions. The idea of blended spaces is built upon the 1993 "conceptual blending" theory of cognition developed by Gilles Fauconnier and Mark Tunner (Tunner, Fauconnier, 2009), extended with human-computer interaction and software engineering concepts of Manuel Imaz and David Benyon (Imaz, Benyon, 2007). Blended space presents a concept in which the physical and virtual environments are closely integrated to provide the experience of presence in such a space. The simplest form of blended spaces consists of two main features – input to virtual space and response from virtual space, with input ranging from tactile to environmental changes and response ranging from visual notifications to olfactory senses (Fig. 5).

Despite the long history behind the idea of XR, the concept itself was not feasible until recently, mainly because of unavailability of underlying technologies, including necessary processing power and sensors and because of the high cost of licensing of existing toolsets. Widespread use of handheld mobile devices such as smartphones and tablets possessing some of the necessary technologies, including orientation sensors, high-quality cameras and microphones and location-based technology, has led to increased availability and affordability of XR-based tools.
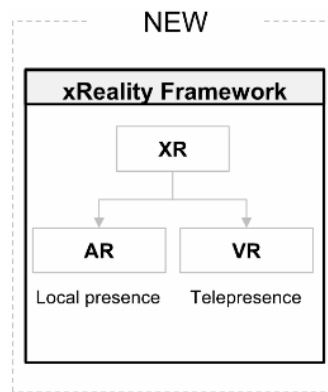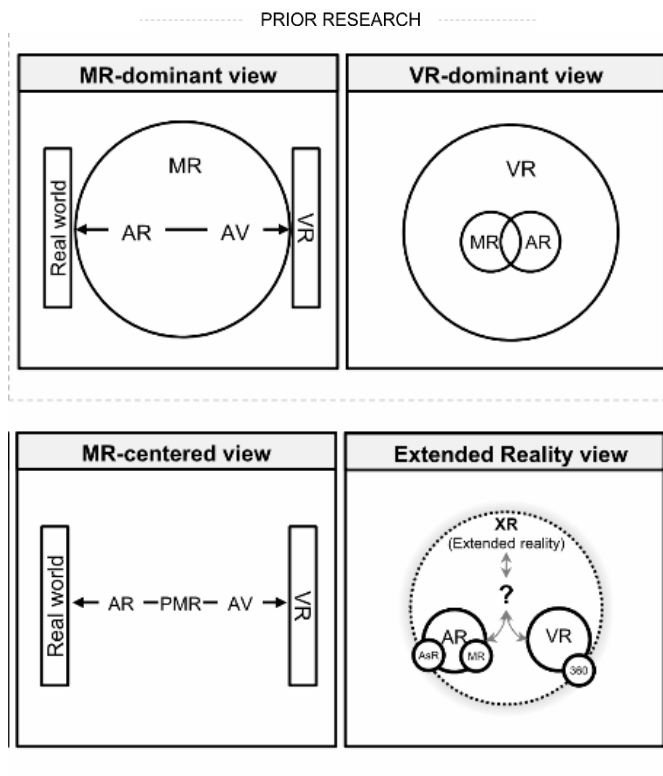
Fig. 3. Diagram of collected viewpoints (prior research vs. new) on different realities (Source: Rauschnabel, 2022)
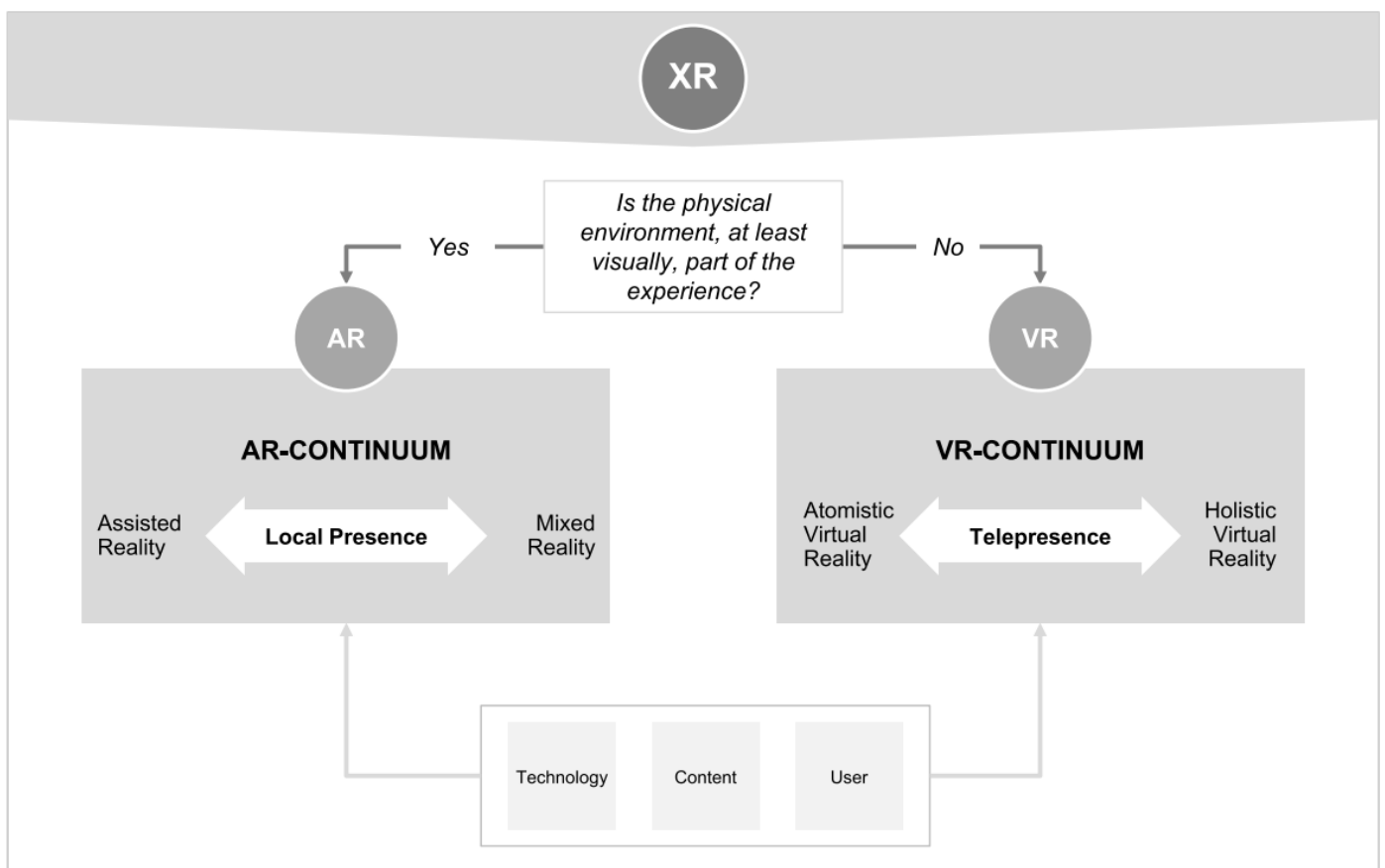

Fig. 4. Diagram of xReality framework proposal. (Source: Rauschnabel, 2022)
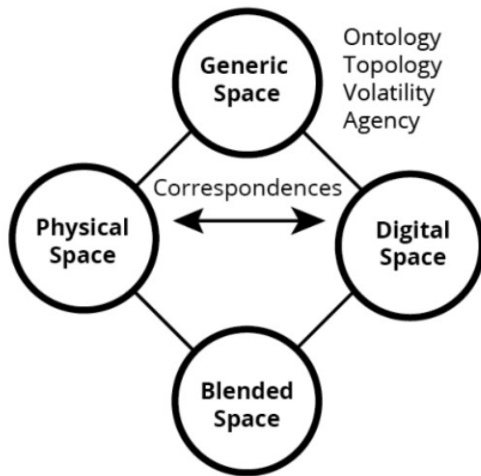
Fig. 5. Basic structure of blended spaces (Source: Benyon, Resmini, 2017)

BASIC FORMS OF AR

One of the simplest forms of AR is optical tracker-based and image-based recognition. This relatively simple to compute solution enables real-world object tracking even to lower-end devices without special sensors. Objects are tracked using QR or ArUco markers of defined real-world size or predefined image patterns are used. Those are pinned to the virtual representation of such a marker. This solution is simple but lacks the awareness of the world around the viewport. Smartphones and tablets utilise a multitude of technologies that provide information about their position in the real world, thus enabling them to provide an interface between physical environment and virtual environment at different levels of experience and integration.

A more immersive type of AR includes mediation devices such as Microsoft HoloLens, a headset with semi-transparent displays used to project digital information before spectator's eyes and seamlessly extending human vision while retaining the ability to manipulate objects present in the physical world. It adds a layer of perception and complements environment. (Sebeom, Bokijonov, Choi, 2021) This is very similar to VR technology with the only difference of VR being fully immersive. When combined with marker-based tracking technology, trackers can be used to inexpensively address real-world object location, rotation and scale. Software tools such as Fologram (Jahn, Newnham, van den Berg, Beanland, 2019), a mobile handheld and HoloLens application can be used in combination with computer modelling (Rhino 3D) and parametric computational software (Grasshopper) for environmental simulations (Ladybug, etc.) or form-finding.

A combination of GPS sensors and AR image tracking merges into location-based AR. It allows AR-specific elements of real-world environment to be enhanced or supplemented with computer generated content. (Chou, Chanlin, 2014) Tools like this help spectators understand spatial, environmental, and historical contexts more seamlessly and in the physical world scale. During the COVID pandemic, visiting inaccessible places through XR virtual tours presented a new way of thinking about what is possible within spaces normally bound by strict rules, providing visitors access to inaccessible or even forbidden places. (Allal-Chérif, 2022)

XR in AEC

A 2020 Davila Delgado study (Delgado, Oyedele, Demian, Beach, 2020) aims at creating a comprehensive overview of the status of XR usage within the Architecture, Engineering and Construction (AEC) sector. Different levels of real-world separation provide endless possibilities of presentation, visualisation and examination of proposed projects. The study also addresses current limits of XR technologies. AR and VR, while sufficient for visualisation and exploration purposes, are not yet reliable, robust and user-friendly enough to be fully implemented with real-life industrial requirements in mind. (Palmarini, Erkoyuncu, Roy, Torabmostaedi, 2018)

A list of six general use-cases has been assembled using a combination of qualitative and quantitative data collection methods: (1) Stakeholder engagement, (2) Design support, (3) Design review, (4) Construction support, which has four sub-categories: construction planning, progress monitoring, construction safety, and operative support; (5) Operations and management, and (6) Training. AR and VR can be used to extend presentation experience, project analysis and form-finding. (Devagiri, Paheding, Niyaz, Yang, Smith, 2022)

Some of the tools mentioned above are used in commercial and educational environment. HoloLens and multiple current smartphones can be used as localization and spatial mapping tools in prototyping autonomous vehicles (Moezzi, Krcmarik, Bahri, Hlava, 2019) or as an augmented fabrication assistant. (Jahn, Newnham, van den Berg, Beanland, 2019) Another system uses MR to sync physical world changes to the BIM model of the project such as furniture location planning or HVAC pipe inspection. Various MR technologies have been used to visualize data for regular users, including street and indoor navigation.

XR AS AN EDUCATIONAL TOOL

The authors explore possibilities and ways of encouraging students and the public to use and create their own AR experiences using freely available tools. Multiple libraries, SDKs, tools are available with varying degree of usability, adoption, availability, and cost. Currently, multiple tools for creating XR experiences with varying degrees of creative freedom and learning curves are freely available. Multiple toolkits, such as Vuforia, AR Toolkit, or various software development kits (SDKs), including those of Oculus Rift or HoloLens, enable the highest level of modification and integration, with the main drawback being the need for highly advanced programming skills.

Streamlining the process, with Unity as a gaming engine with its integrated tools, makes it possible to develop a range of XR experiences from simple to the most complicated, without the inherent need for programming language knowledge. With little effort, it also enables sending XR experiences to multiple end devices, including mobile, desktop and web-based applications. The main drawback of this software is its relatively steep learning curve. (Barroso, Gutiérrez-Castillo, Llorente-Cejudo, Ortiz, 2019) One alternative to these highly specific tools is Spark AR, with its underlying ecosystem. It is primarily used as an entertaining way for users to interact with social networks. However, it can also be used as a simple introductory tool for teachers to create immersive educational XR experiences using node systems logic programming for their students without needing to have any programming skills.

Both AR and VR help contextualize small scale ideas, explore proposed urban planning, and garden architecture scenarios on-location (Cirulis, Brigmanis, 2013), or visualize final concepts as a form of presentation. MR as a tool inherently introduces gami-

fication aspects into its operation. Malone (1981) focuses on what makes games fun, categorising his findings into three categories: challenge, fantasy, and curiosity. By applying gamification aspects to MR workflows, higher engagement and learning rewards can be achieved. Despite the useful capabilities MR technologies, it is crucial to ensure that user's cognitive overload is prevented. During a typical AR or VR experience, users are required to simultaneously interpret content, manipulate the device and objects, and collaborate with others. (Dunleavy, 2014) Large data set aggregation, processing, and subsequent interpretation through the computational-design workflow can help to visualize data by embedding them into AR software and orienting them in a physical world, which creates new interaction opportunities between computational design tools and designers. In combination with AI, increased workflow efficiency can be achieved.

TANGIBLE LANDSCAPES

Natural interaction between the user and computational design tools has been further improved with the use of Tangible User Interfaces (TUI). The study on TUI by Kim and Maher (2008) compared it with GUI and explored its impact on collaborative and participative design. The study found that the physical interaction with objects in TUIs improves designers' spatial cognition and offloads the designer thinking. The naturalness of the direct hands-on approach helps designers' immersion in designing, thus allowing them to perform spatial reasoning more effectively. In 2011, a study on TUIs paired augmented reality with tangible interaction and compared it to conventional interaction via GUIs, while it encouraged designers to engage in more exploratory design actions, creative interpretations, enhanced communication, and overall experience in collaborative design tasks while working in groups. (Gu, Kim, Maher, 2011)
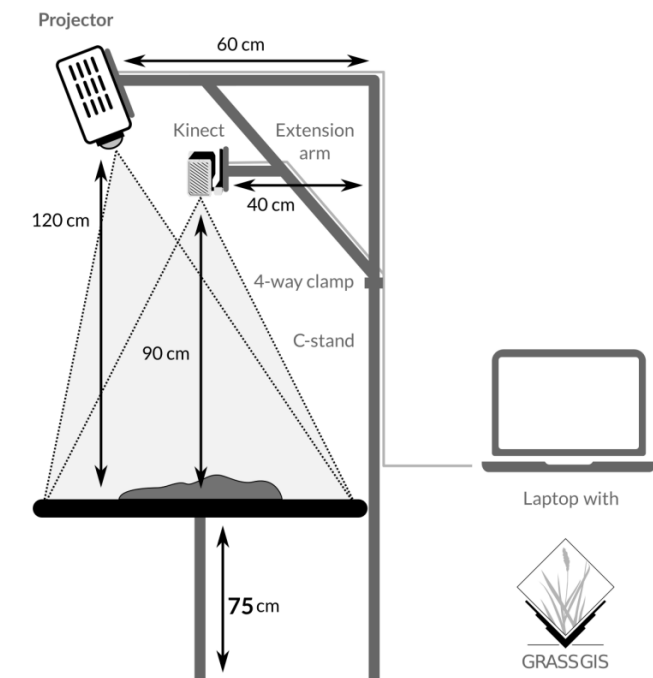
Fig. 6. Setup of tangible landscape (Source: Millar, Tabrizian, Petrasova, Petras, Harmon, Mitasova, Meen-temeyer, 2018)

A recently popular and widely used special type of tool combining AR and TUI in the collaborative modelling is tangible landscape. As a study (Millar, Tabrizian, Petrasova, Petras, Harmon, Mitasova, Meentemeyer, 2018) explains, tangible landscape allows users to model the scaled landscape by hand physically,

3D-scan it and virtualise it in a computer. The virtualised model can be used for various analyses or computation, which may be processed and then visualised back on the physical model, giving the users instant feedback. As the name of this tool indicates, it is mainly used for landscape and geospatial modelling and simulation. The tool is assembled with a mass for physical modelling – mainly kinetic sand, projector, 3D scanner and a computer (Fig. 6). As this setup with only one projecting and one scanning device allows sufficient scanning and projecting only on 2.5D objects, it is suitable for use in large-scale landscape modelling. As it enables a very natural interaction between the users modelling their common design, and is completely open-source, tangible landscape has quickly gained a community of users across the world.

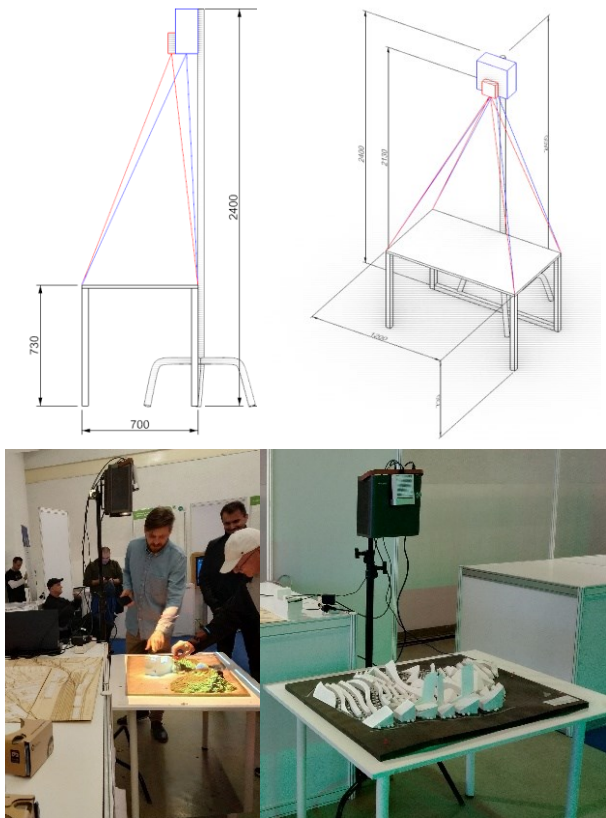### TANGIBLE LANDSCAPE AS ARCHITECTURAL DESIGN TOOL

The research in this article explores the possibilities of extending the utilisation of the tangible landscape tool beyond the large-scale planning, into the architectural and urban planning domain. The use of different, more suitable software for architectural profession was a key factor in the adaptation of the tool for architectural use, as the originally-used GRASS GIS software was developed mainly for large scale geo-modelling. The originally used GRASS GIS software is a powerful computational tool with a robust open-source community; however, it was developed mainly for large scale geoinformation systems, not for detailed 3D modelling on the architecture scale. From the wide range of the architectural software tools the program Rhinoceros was chosen, as it is widely used by architects, and it is capable of the algorithmic modelling with the Grasshopper extension with plenty of plugins and pre-made scripts.

The rest of the setup of the first prototype constructed at the Faculty of Architecture and Design of the Slovak University of Technology in Bratislava, Slovakia, (FAD STUBA) is very similar to the original product of the aforementioned study (Millar, Tabrizian, Petrasova, Petras, Harmon, Mitasova, Meentemeyer, 2018). The main difference is a projector, which is able to project the bottom border of the image in the plane of its base, which allowed simplification of the stand holding it and a 3D scanner. Azure Kinect DK with 4096 × 3072 px resolution was used as the 3D scanner, mounted directly on the projector (Fig. 7). In Grasshopper, the script for 3D scanning with Azure Kinect GH plugin was prepared (Ahn, 2022). The outcome of the scanning are 3D points in a proper scale, which are subsequently automatically filtered and adjusted. The 3D points then serve as an input for computation and data visualisation. The current prototype is capable of point-depth colouring, preparing animation visualisation and constructing mesh geometry. The resolution of constructed mesh from scanned points is provided in Fig. 8.

Mesh constructed from points allows further analysis, such as contour line visualisation (Fig. 9), and shadow or solar irradiation analysis with Ladybug plugin. These computed data were afterwards projected back on the physical model, giving feedback to the designer. The scanning and computation were performed on physical models from different materials, in different scales - the model of an urban neighbourhood designed as a solar envelope, the lasered plexiglass urban area model, the 3D printed model of a residential building and on models made from kinetic sand, modelled by visitors to the Night of Researchers event in Bratislava, Slovakia. The solar irradiation analysis is currently performed with the tool and computations done annually, using a discretized model of the sky dome made of 145 patches based on Tregenza subdivision (Tregenza, 1987) with calculated annual solar radiation for each patch.

The model is based on Perez formulas for sky luminance distribution (Robinson, Stone, 2004; Perez, Seals, Michalsky, 1993). The algorithm GenCumulativeSky in Ladybug calculates the irradiations of sky patches from direct normal and diffuse horizontal irradiance values noted as measured values in a list as part of EnergyPlus Weather file - reference climate data per one year, in a specific place (Energyplus, 2020; Radsite, 2020). The current prototype of tangible landscape uses the location of Bratislava but it is possible to easily change it to other places with available EnergyPlus Weather file. The projection of the solar irradiation analysis is in Fig. 10. All those visualisations run on the single push of the button, without any digital modelling or scripting knowledge required on the part of the user. Every operation took different time to compute, allowing interaction with the tool in real time, or interaction in time intervals (Tab. 1).


Fig. 7. Setup of the tangible landscape at the Faculty of Architecture and Design, Slovak University of Technology in Bratislava, Slovakia (Model: students Daniela Martinkovičová, Mária Mihaľková, supervised by Julián Keppl and Klára Macháčová; Source: Uhrík, Kupko, Krpalová, Hajtmanek - authors)
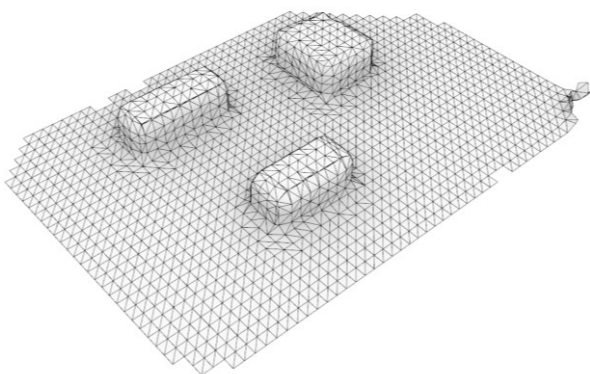
Fig. 8. Reconstructed mesh from 3D scanned points. (Source: Uhrík, Kupko, Krpalová, Hajtmanek - authors)
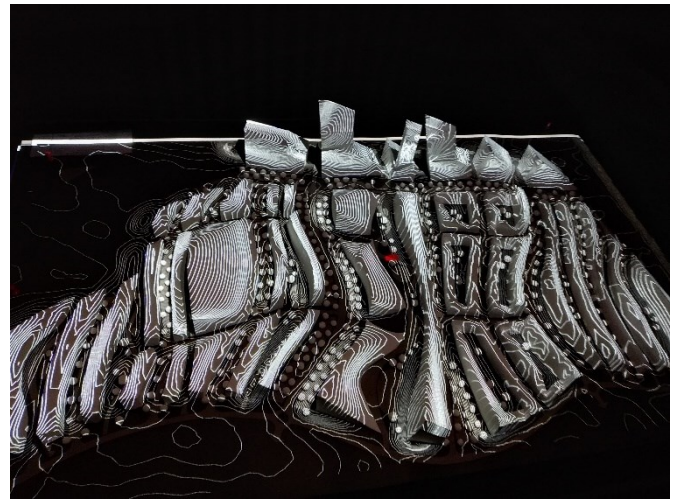
Fig. 9. Contour lines visualisation on the physical model of an urban area. (Model: students Daniela Martinkovičová, Mária Mihaľková, supervised by Julián Keppl and Klára Macháčová; Source: Uhrík, Kupko, Krpalová, Hajtmanek - authors)
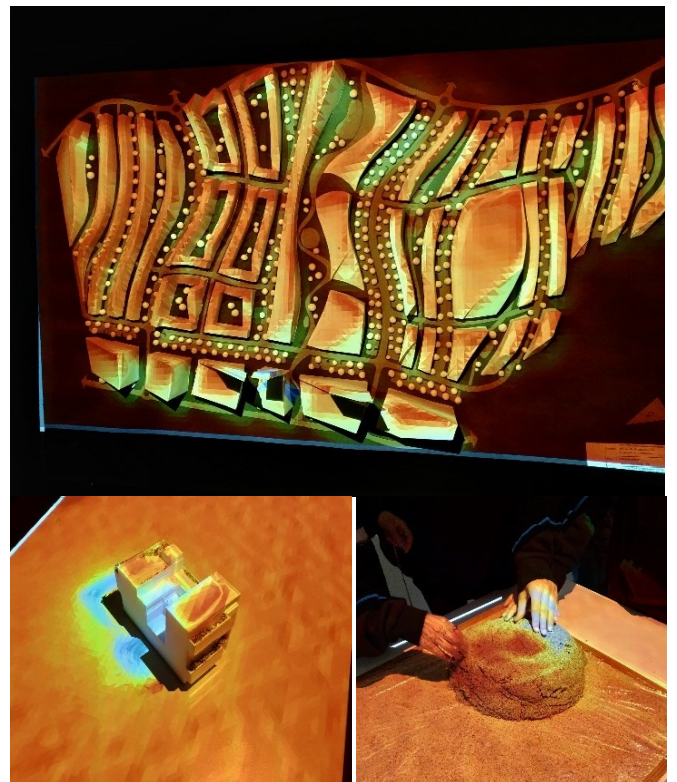
Fig. 10. Top – solar irradiation of the urban area. Bottom left – solar irradiation of the residential building – 3D printed model. Bottom right – scanning and modelling with kinetic sand by visitors to the Night of Researchers event in Bratislava, Slovakia. (Model: students Daniela Martinkovičová, Mária Mihaľková, supervised by Julián Keppl and Klára Macháčová; Source: Uhrík, Kupko, Krpalová, Hajtmanek - authors)

Tab. 1. Time of computation – responsiveness of the system. (Source: Uhrík, Kupko, Krpalová, Hajtmanek - authors)

Type of computation	Required time
Points depth colouring	under 100 ms
Prepared animation	under 100 ms
Constructing mesh	circa 2 s

Shadow analysis	circa 6 s
Solar analysis	circa 8 s

DIGITAL DATA AS TANGIBLE PARTS

Non-parametric computational design strategies

The ways in which architecture is notated, and the use of tools may influence fabrication methods as well as its conceptual and aesthetical aspects. Professor of Architectural Theory and History, Mario Carpo, examines in his work how the evolution of computation has been affecting contemporary architecture. He describes the use of parametric tools that initiated the boom of the parametric architecture movement as *"The Digital Turn in Architecture"*. (Carpo, 2014) For the past 10 years a shift in the paradigm of computational design has become more pronounced. Carpo initially identified this phenomenon as a discontinuity between the mainstream and the academic aesthetics. The general image of designs produced by computational design tools follows the style of parametric architecture, which is smooth, curvy and continuous. However, nowadays, the designs created at school and in some experimental projects are *"disjointed, disconnected and fragmentary – often voxelized, filamentous or chunky"*. (Carpo, 2019)

This shift, labelled by Carpo as *"The Second Digital Turn"*, introduced the then-new, emerging discrete architecture movement. Their attitude towards notation of architectural designs has been changing. Computational designers aspire to create a setting where digital design and fabrication processes stem from close human-machine cooperation. With the utilization of robotics and tools of digital fabrication, the data do not require a notation understandable to the human mind. The notion of discrete comes from the mathematical term that means being individually separate and distinct. The digital notation of raw data used by computers utilizes the format of discrete mathematics that describes objects as countable, finite sets, as a list of the positions in space (x-, y-, z-coordinates). That opposes the previously compressed and simplified data recorded using the human logic of parametric equations. In conclusion, the revised model of computation logic has resulted in research of non-parametrical design strategies.

Fig. 11. Block' hood project. (Source: Sanchez, 2016)

"It asserts that a digital form of assembly, based on parts that are as accessible and versatile as digital data, offers the greatest promise for a complex yet scalable open-ended and distributed architecture." (Retsin, 2019a) This development opens the discussion on how tools and devices can support such cooperation in architectural design. Jose Sanchez has introduced an approach named combinatorial design and outlined how this approach can be utilized in practice. Combinatorial design is an approach that uses modular, discrete elements and combinato-

rial algorithms that compute their possible aggregation. (Sanchez, 2016) Such an approach has been illustrated within VR environments trough gamification. The first illustrative project was a Block'hood game (Fig. 11), a video-game interface that was used in the study of collective architectural engagement using real-time interactive platforms. The study indicated that interactive platforms facilitate an enhanced decision-making process, one in which human intuition is coupled with algorithmic intelligence. (Sanchez, 2016) In the following project, Virtual warehouse facility (Fig. 12.) interface allowed users to design and simulate the fabrication of Discrete Architecture Projects. (Sanchez, 2019)
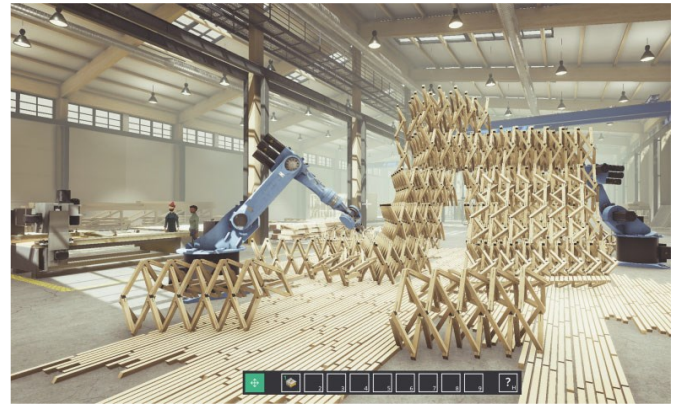
Fig. 12. Virtual warehouse facility project. (Source: Sanchez, 2019)

Prospects of human-machine cooperation

In academia, Bartletts', UCL Research Cluster 9 (RC9) led by Soomeen Hahm (Fig. 13) and Alvaro Lopez Rodriguez, has outlined ways in which AR and tangible elements can be involved in the computational design process. The recurring theme of the use of XR devices is present in the projects of RC9, with the focus on redefining the role of humans, machines, and computers. Researchers propose a workflow, where humans use AR devices to design and assemble models. In this case, discrete parts have become the tangible interface of combinatorial design tools. *"This is to propose an alternative to reducing construction to fully automated assembly of simplified/discretized building parts, by appreciating physical properties of materials and nature of crafting processes."* (Hahm, 2019) In 2019, Gilles Retsin demonstrated the potential of discrete design and fabrication through the use of an AR tool, fologram and combinatorial algorithm in a real-life scale prototype (Fig. 14). *"We used AR to send instructions directly from the digital model to the team working on site. AR therefore helps us understand what a fully automated construction process would look like, where a digital model communicates directly with people and robots on site."* (Retsin, 2019b)
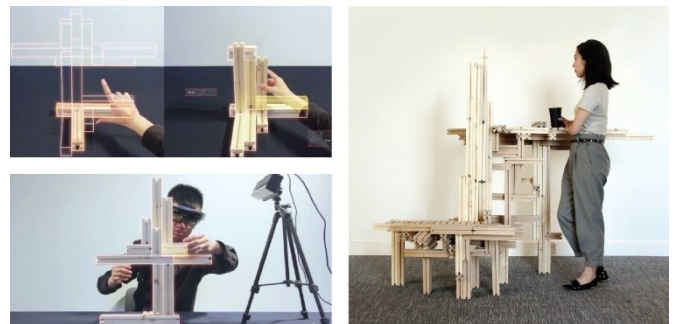
Fig. 13. iBrick project. (Source: Hahm, 2019)

Authors of this paper have also been participating in an ongoing project Monoceros, which has resulted in a combinatorial design toolset similar to those mentioned in earlier examples (Subdigital, 2021). The Monoceros project (Fig. 15) is a suite of tools from the Subdigital studio in the form of a freely available plugin for Grasshopper 3D. The plugin is created with an emphasis on computing power, stability and ergonomics of use for designers and architects. Monoceros is an implementation of the Wave Function Collapse (WFC) algorithm. The tool makes it possible to digitally design and materialize composite objects in scales ranging from jewellery, through spatial installations to urban structures from a limited number of repeating elements or modules. With a limited number of modules, it is possible to create an unlimited number of unexpected objects that will have the expected aesthetic, qualitative, functional and structural properties. With its simple use and adaptation for the purposes of architectural design, it democratizes and makes the otherwise complicated WFC available for the purposes of computational design. Further development of this universal toolset and its implementation in XR environments could result in multiple projects with various uses.

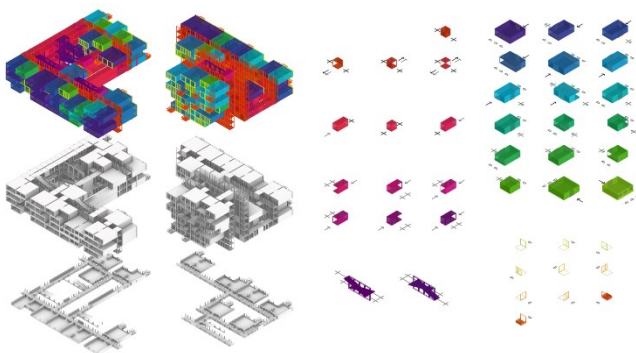**Fig. 14.** Real Virtuality Project. (Source: Retsin, 2019b)

Fig. 15. Monoceros housing study. (Souce: Subdigital, 2021)

CONCLUSION

Computational tools are powerful aid to design; nevertheless, their popularity is currently decreasing. Young authors rather prefer easy-to-learn and intuitive tools. In the current fast-forward world, nobody has time to learn slowly. An easy-to-use interface and attractive envelope are as important as the tool's capabilities. Exploring new interfaces, such as TUI or XR may make those tools more human and bring them closer to their users. That was also the aim of the prototype of the tangible landscape at the FAD STUBA. The use of the prototype has already shown that it can improve communication during the collaboration as it blends the physical 3D and digital layers. As a result, the design is more legible and design decisions are more intuitive. The plan for follow-up research is to pursue its utilisation in modular and discrete architectural projects using components and designing from inside out, with possible implementation of the Monoceros tool (Subdigital, 2021).

Another aspect of the tool is its educational potential. Interactive engaging of the touch and visual senses has led to better understanding and remembering of the concept mainly with the younger audience from secondary schools, who saw the tool at the Night of Researchers event in Bratislava Slovakia. Despite the benefits of the prototype, new areas for improvement have been identified. As the current setup of the tangible landscape 3D-scans only the depth of the physical model, it captures the facades insufficiently. The plan is to enhance the prototype with with more 3D scanners on the sides of the table to capture also facades of the objects. The planned improved version is in Fig. 16.
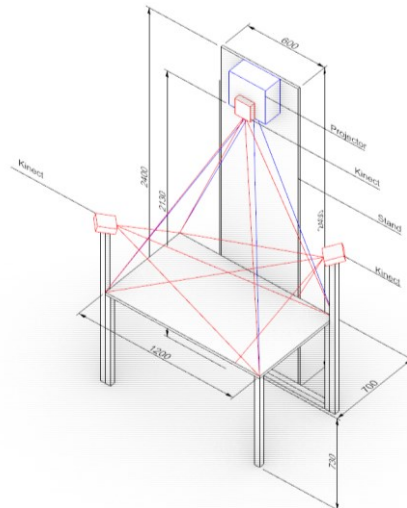

Fig. 16. An improved planned version with three 3D scanners. (Source: Uhrík, Kupko, Krpalová, Hajtmanek - authors)

Another improvement is that the main scanning Kinect, above the model, will be mounted at different height, as the current resolution of scanning is not sufficient. The projector will be placed higher, which will eliminate shadows produced by projecting. The use of Grasshopper has shown that the scanned model could be further modified with its large library of plugins, or in a 3D environment of Rhinoceros, well-known to architects. Nevertheless, the Grasshopper's computation times of some operations are too long for the intuitive interaction. The next plan is to experiment with Blender as an opensource engine for running 3D scanning and computation with its extensions Geometry Nodes and plugin Sverchok with Ladybug toolset. As Blender is usually used as animation software for high-poly scenes, it may increase the speed of the Tangible Landscape and its interaction with users.

The tool was tried with different materials used for the physical models. This experimentation has revealed that kinetic sand is less suitable for modelling buildings or spaces than for modelling landscapes. This mass is too liquid, which means it is only

possible to model urban area models in scale 1:1000 or 1:5000. The materials usually used for analogue architectural models – paper, cardboard and 3D printed matt PLA – were used by the tool without any problems. On the other hand, the use of plexi-glass revealed that the scanning did not work as expected, and the reflections and plexiglass blocks were scanned as holes in the base board. 3D print from highly reflective PLA might also have this problem.

Nowadays, even larger architectural offices rather prefer to use simplistic, easy-to-learn design tools, e.g., SketchUp, instead of BIM, even in the execution phases, as their dynamic teams and interns learn to use the tools quickly, during their work, without the need for additional investment into their training. It seems that even if mistakes emerge in this process, it is inexpensive in comparison to the investments into the education and training of employees needed for more powerful software in terms of computation, automation and design analysis. This is probably the face of the new fast architecture. Making the computational tools more accessible and intuitive for everyone is a way to use different approaches to design more widely and to be more original, or to evaluate the outcomes during the design, and thus bring more efficient and meaningful solutions.

Acknowledgements

References

Ahn, A. J. (2022) "AZURE KINECT GH". [online] Available at: https://www.food4rhino.com/en/app/azure-kinect-gh

Allal-Chérif, O. (2022) "Intelligent cathedrals: Using augmented reality, virtual reality, and artificial intelligence to provide an intense cultural, historical, and religious visitor experience", Technological Forecasting and Social Change, Vol. 178. https://doi.org/10.1016/j.techfore.2022.121604

Barroso Osuna, J., Gutiérrez-Castillo, J. J., Llorente-Cejudo, M. d. C., Ortiz, R. V. (2019) "Difficulties in the Incorporation of Augmented Reality in University Education: Visions from the Experts." Journal of New Approaches in Educational Research, Vol. 8(2), pp. 126-141. https://doi.org/10.7821/naer.2019.7.409

Carpo, M. (2014) "Breaking the curve: Big data and design", Artforum, Vol. 52(6). [online] Available at: https://www.artforum.com/print/201402/breaking-the-curve-big-data-and-design-45013 [Accessed: 17 Oct 2022]

Carpo, M. (2019) "Particlised: Computational Discretism, or The Rise of the Digital Discrete", Architectural Design, Vol. 89(2), pp. 86-93, https://doi.org/10.1002/ad.2416

Chou, T., Chanlin, L. (2014) "Location-Based Learning Through Augmented Reality", Journal of Educational Computing Research, Vol. 51(3), pp. 355-368. http://dx.doi.org/10.2190/EC.51.3.e

Cirulis, A., Brigmanis, K. B. (2013) "3D Outdoor Augmented Reality for Architecture and Urban Planning", Procedia Computer Science, Vol. 25, pp. 71-79. https://doi.org/10.1016/j.procs.2013.11.009

Davila Delgado, J. M., Oyedele, L., Demian, P., Beach, T. (2020) "A research agenda for augmented and virtual reality in architecture, engineering and construction", Advanced Engineering Informatics, Vol. 45. https://doi.org/10.1016/j.aei.2020.101122

Devagiri, J. S., Paheding, S., Niyaz, Q., Yang, X., Smith, S. (2022) "Augmented Reality and Artificial Intelligence in industry: Trends, tools, and future challenges", Expert Systems with Applications, Vol. 207. https://doi.org/10.1016/j.eswa.2022.118002

Dunleavy, M. (2014) "Design Principles for Augmented Reality Learning", TechTrends, 58(1), pp. 28-34. https://doi.org/10.1007/s11528-013-0717-2

Energyplus (2020) "Weather Data". [online] Available at: https://energyplus.net/weather

Gu, N., Kim, M. J., Maher, M. L. (2011) "Technological advancements in synchronous collaboration: The effect of 3D virtual worlds and tangible user interfaces on architectural design", Automation in Construction, Vol. 20(3), pp. 270-278. https://doi.org/10.1016/j.autcon.2010.10.004

Hahm, S. (2019) "Augmented Craftsmanship", ACADIA 19: Ubiquity and autonomy, pp. 448-457. https://doi.org/10.52842/conf.acadia.2019.448

Imaz, M., Benyon, D. (2007) "Designing with blends: conceptual foundations of human-computer interaction and software engineering", MIT Press, Cambridge, USA, pp. 43-48, Available at: https://archive.org/details/designingwithble0000imaz/page/228/mode/2up

Jahn, G., Newnham, C., van den Berg, N., Beanland, M. (2019) "Making In Mixed Reality", Conference: Recalibration: On Imprecision and Infidelity, Mexico City, Mexico, USA. Available at: https://www.researchgate.net/publication/330158065_Making_in_Mixed_Reality

Kymäläinen, T., Siltanen, S. (2012) "Co-designing Novel Interior Design Service That Utilises Augmented Reality – a Case Study", In: Communicability, Computer Graphics and Innovative Design for Interactive Systems (CCGIDIS 2012), Valle d'Aosta, Italy

Malone, T. W. (1981) "Toward a Theory of Intrinsically Motivating Instruction", Cognitive Science, Vol. 5(4), https://doi.org/10.1207/s15516709cog0504_2

Milgram, P., Kishino, F. (1994) "A Taxonomy of Mixed Reality Visual Displays", IEICE Transactions on Information and Systems, Vol. E77-D (12), pp. 1321-1329. Available at: https://cs.gmu.edu/~zduric/cs499/Readings/r76JBo-Milgram_IEICE_1994.pdf

Millar, G., Tabrizian, P., Petrasova, A., Petras, V., Harmon, B., Mitasova, H., Meentemeyer, R. (2018) "Tangible Landscape: A Hands-on Method for Teaching Terrain Analysis", In: Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, pp. 1-12. https://www.doi.org/10.1145/3173574.3173954

Moezzi, R., Krcmarik, D., Bahri, H., Hlava, J. (2019) "Autonomous Vehicle Control based on HoloLens Technology and Raspberry Pi Platform: an Educational Perspective", IFAC-PapersOnLine, Vol. 52(27), pp. 80-85. https://doi.org/10.1016/j.ifacol.2019.12.737

Palmarini, R., Erkoyuncu, J. A., Roy, R., Torabmostaedi, H. (2018), "A systematic review of augmented reality applications in maintenance", Robotics and Computer-Integrated Manufacturing, Vol. 49, pp. 215-228. https://doi.org/10.1016/j.rcim.2017.06.002

Perez, R., Seals, R. Michalsky, J. (1993) "All-weather model for sky luminance distribution—Preliminary configuration and validation", Solar Energy, Vol. 50(3), pp. 235-245. https://doi.org/10.1016/0038-092X(93)90017-I

Radsite (2020) "gendaymtx". [online] Available at: https://www.radiance-online.org/learning/documentation/manual-pages/pdfs/gendaymtx.pdf/view

Rauschnabel, P. A., Felix, R., Hinsch, C., Shahab, H., Alt, F. (2022). "What is XR? Towards a framework for Augmented and Virtual Reality", Computers in Human Behavior, Vol. 133. https://doi.org/10.1016/j.chb.2022.107289

Retsin, G. (2019) "Bits and pieces: Digital Assemblies: From Craft to Automation", Architectural Design, Vol. 89(2), pp 38-45. https://doi.org/10.1002/ad.2410

Retsin, G. (2019) "Gilles Retsin fuses augmented reality with timber construction at the Royal Academy London". [online] Available at: https://www.designboom.com/architecture/gilles-retsin-architecture-real-virtuality-the-royal-academy-london-04-11-2019 [Accessed: 17 Oct 2022]

Robinson, D., Stone, A. (2004) "Irradiation modelling made simple: the cumulative sky approach and its applications", 21st Conference on Passive and Low Energy Architecture, Eindhoven, Netherlands, Vol. 2, pp. 1255-1259. Available at: https://alexandria.tue.nl/openaccess/635611/p1153final.pdf

Sanchez, J. (2016) "Combinatorial design: Non-parametric computational design strategies" In: ACADIA 16 POSTHUMAN FRONTIERS: Data, Designers, and Cognitive Machines, pp. 44-53. https://doi.org/10.52842/conf.acadia.2016.044

Sanchez, J. (2019) "Architecture for the Commons: Participatory Systems in the Age of Platforms", Architectural Design, Vol. 89(2), "Discrete: Reappraising the Digital in Architecture", pp 22-29. https://doi.org/10.1002/ad.2408

Schnabel, M. A., Xiangyu, W., Seichter, H., Kvan, T. (2007), (Ed.) Poggenpohl, S. "From Virtuality to Reality and Back", INTERNATIONAL ASSOCIATION OF SOCIETIES OF DESIGN RESEARCH 2007 (IASDR07), School of Design, The Hong Kong Polytechnic University 2007 Core A, Hung Hom, Kowloon, Hong Kong, China. ISBN 988-99101-4-4, Digital Proceedings, Day 4, Session D: INTERACTION/INTERFACE. Available at:

https://www.drhu.eu/wp-content/uploads/2012/05/FromVirtualityToRealityAndBack.pdf

Schnädelbach, H. M. (2007) "Mixed Reality Architecture" (doctoral thesis), University College London. Available at: https://discovery.ucl.ac.uk/id/eprint/16045/1/16045.pdf

Sebeom, P., Bokijonov, S., Choi, Y. (2021) "Review of Microsoft HoloLens Applications over the Past Five Years", Applied Sciences, Vol. 11(16). https://doi.org/10.3390/app11167259

Steed, A. (2013) "Recreating Visual Reality in Virtuality", In: Grimshaw-Aagaard, M. (ed.) "Oxford Handbook of Virtuality", Oxford University Press, New York, USA, pp. 430-435. https://doi.org/10.1093/oxfordhb/9780199826162.013.016

Subdigital (2021) "Project Monoceros", [online] Available at: https://issuu.com/subdigital/docs/project_monoceros [Accessed: 17 Oct 2022]

Tichá, J. (2006) "Architektura v informačním věku: texty o moderní a současné architektuře II" (Architecture in the information age: Texts on modern and contemporary architecture II), Zlatý Řez, Praha, Czech Republic, p. 65. ISBN 80-902810-8-7 (in Czech)

Tregenza, P. R. (1987) "Subdivision of the sky hemisphere for luminance measurements", Lighting Research & Technology, Vol 19(1). https://doi.org/10.1177/096032718701900103

Tunner, M., Fauconnier, G. (2009) "Conceptual Integration and Formal Expression", Metaphor and Symbolic Activity, Vol. 10(3), pp. 183-204. https://doi.org/10.1207/s15327868ms1003_3

Redefining the learning experience in design education at the Slovak University of Technology in Bratislava

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Abstract:

The present paper offers the results and evaluation of quantitative research conducted during the years 2019 and 2020 among prospective graduates and alumni of the follow-up bachelor and master study programmes of Design at the Faculty of Architecture and Design of the Slovak University of Technology (FAD STU) in Bratislava, Slovakia. The presented results of the research, combined with an analysis of the local labour market data, study of literature and an evaluation of global design education trends, were used as the foundation for changes in the learning process in design education at FAD STU, first-time implemented in the existing study programmes in the academic year 2021/22. The paper aims to provide an explanation of the new approach to learning experience design within the bachelor and master study programmes as such, but main-ly described on the example of Design Studio courses. At the time of publishing, the new approach was successfully implemented in one of the faculty's vertical studios – MX lab – a learning platform focused on project-based learning and cooperation with partners in the automotive industry.

Keywords:

design education, project-based learning, soft skills, design graduates, creative thinking, interdisciplinarity, learning experience design, teamwork, product design, vertical studio

INTRODUCTION

Digital and communication technologies have accelerated the flow of information and its transition to knowledge. Interaction, speed and open-source platforms that emerged with the rise of the internet, access to vast scientific data resources, or even peer learning force the world to re-evaluate and redefine not only the old conservative model of institutional education but also the meaning of the fundamental understanding of "educa-tion" and "knowledge" as such. Formal education in the field of design, due to the rapid development in the design industry, is certainly one in which academic research practices combined with the length of standard funding and publication cycles cause knowledge delays and its rapid obsolescence.

Traditionally, art and design education has inherited a strong focus on individual work and manual craftsmanship. Industrial design as a discipline has been focused on physical products ever since. That could explain why *"university industrial design programmes are usually cloistered in schools of art or architec-ture"* (Talbot, 2011). Today, however, industry experts state that *"designers work on organizational structure and social problems, on interaction, service, and experience design. Many problems involve complex social and political issues. As a result, designers have become applied behavioural scientists, but they are woefully undereducated for the task"* (Norman, 2010).

The complexity of societal and scientific problems requires a change in this approach. The need for both inter-personal and intra-personal qualities – soft skills – has emerged. Further-more, interdisciplinary and transdisciplinary cooperation has been called for by the business sector and policy-makers. The importance of soft skills is increasing both globally and in design education: *"Soft skills are closely related to what is described as 21st century skills – a broad set of knowledge, skills, work habits, and personal traits that are considered highly important for suc-cess in today's world, especially in modern workplace settings."* (Seery, Canty, O'Connor, Buckley, Doyle, 2016). Soft skills have also been defined as *"a dynamic combination of cognitive and meta-cognitive skills, interpersonal, intellectual and practical skills"* (Haselberger, Oberhuemer, Perez, Cinque, Capasso, 2014). The widely used and the most cited list of soft skills both in the educational field and the labour market refers to the SCANS report (U.S. Department of Labour, 1992) and MODES final report, where Haselberger, Oberhuemer, Perez, Cinque, and Capasso (2014) identify 22 soft skills and cluster them into

three groups: personal, content-reliant or methodological, and social (Seery, Canty, O'Connor, Buckley, Doyle, 2016).

The Future of Jobs Report 2020 released by The World Economic Forum indicates that half of today's working population will be required to re-skill in a five years' time. The COVID-19 pandemic has brought double disruption of the economic impacts and the ongoing demand for automation. Critical thinking and problem-solving have occupied the leading positions on the list of soft skills of tomorrow since 2016 and are still top-ranking (Tab. 1). Furthermore, the era of repeated lockdowns has revealed the importance of skills in self-management such as active learning, resilience, stress tolerance, and flexibility (Whiting, 2020).

Tab. 1. Comparison of top skills according to the Future of Jobs Report 2020, World Economic Forum. (Source: World Economic Forum, 2020)

Top 5 skills of 2015	Top 5 skills of 2025
Complex problem-solving	Analytical thinking and innovation
Coordinating with others	Active learning and learning strategies
People management	Complex problem-solving
Critical thinking	Critical thinking and analysis
Negotiation	Creativity, originality and initiative

One of the most extensive research projects on the future of design education, conducted globally, was documented in the recently published "White Book on the Future of Design Education," edited by iF Design Foundation. The key findings published in the executive summary confirm many of the abovementioned concerns: *"While 20th century design was primarily understood as a result, design in the 21st century is first and foremost a process. To achieve this successfully in changing teams on an intercultural and interdisciplinary basis, techniques of interpersonal communication must become a central component of design education"* (Böninger, Schmidhuber, Frenkler, 2021, p. 21).

The report further states that *"learning to store-house knowledge (…) should be replaced by project-based learning"* (p. 20), *"designers should be trained as thinkers"* (p. 73), and *"the degree course should place students in a situation where they get involved in the doing and develop their thinking through this''* (pp. 128, 129), along with the need of the students to adopt *"the self-assurance of being able to deal with each new situation"* (p. 157). Throughout the White Book, the "threat" of artificial intelligence – or more specifically the partly already ongoing automation of specialist design tasks such as styling or generation of stock imagery – is mentioned recurrently. In this perspective, experts agree on the need to prepare students *"so that they can ask the right questions,"* which *"machines will soon provide better answers to"* (Böninger, Schmidhuber, Frenkler, 2021, pp. 150, 151).

The White Book, summarised as a result of participative process involving 250 design experts from 4 continents, suggests the following definition of the design discipline and its scope*: "Design aims for specific use by human beings: the use of messages, two-dimensional media, three-dimensional artefacts, interactions, and processes. Design poses fundamental questions, takes into account the context of usage, integrates the perspective and findings of related areas (disciplines) and produces visualisations of specific solution proposals (models, prototypes) with formative tools that are both visual and verbal in nature"* (Böninger,

Schmidhuber, Frenkler, 2021, p. 119). Beside the above listed insights, the editors of the White Book emphasize the need to consider regional and culturally specific differences (Böninger, Schmidhuber, Frenkler, 2021, pp. 21, 257). Except Germany, none of the former Eastern Bloc countries was involved in the research.

LOCAL RESEARCH AND LEARNINGS

Design education at the Slovak University of Technology

The evolution of design education at the Slovak University of Technology dates back to 1981 (Petránsky, 1997, pp. 12–16), when the interdisciplinary study programme "Industrial Design of Engineering Products" was introduced at the Faculty of Mechanical Engineering at the Slovak Technical University (Slovenská vysoká škola technická, abbreviated as SVŠT, renamed in 1991 to carry the current title). The first workplace dealing with industrial and product design was established at the Faculty of Architecture (FA STU) three years before the establishment of the first Department of Design – in 1987 (Department of Architectural Planning and Design). The orientation of the design studies remained highly technical – until 2007 the degree "inžinier" (abbreviated as "Ing.", analogous to Master of Science) was still used even after the transition of the study programme to FA STU, mainly because of the strong focus on the knowledge in the field of mechanical engineering encompassed in the curriculum. At the turn of the centuries, the design study programmes at the FA STU gradually reduced the share of technical courses in favour of courses with focus on the development of creative and artistic skills. This evolution led to the transition to an artistic study programme with the "magister" degree granted at the graduation (abbreviated as "Mgr. art.", analogous to MA).

Increased interest in supporting the design education at the Slovak University of Technology was recently expressed by the extension of the official title of the faculty to Faculty of Architecture and Design, accomplished during the term of dean office of prof. Ing. arch. Pavel Gregor, PhD, with official use of the name starting from September 2020 (FAD STU, 2021). The new Slovak law on quality assurance in higher education, Act No. 269/2018 Coll. (known as the Quality Act, published on 26 Sep 2018 and as effective from 1 Jan 2022) that established the Slovak Accreditation Agency for Higher Education along with a new concept of internal quality system at higher education institutions in Slovakia, provided an opportunity to question and update the existing curriculum. Prior to starting the participatory process of the actual curriculum redesign, a series of surveys had been accomplished by Zuzana Pergerová as a part of her dissertation research in 2018–2021. In order to measure and evaluate the specific needs and education objectives reflecting the employment potential of young design professionals in Slovakia, Pergerová analysed data from the Slovak labour marketplace Profesia.sk and conducted two original quantitative surveys with FAD STU alumni and prospective 2019 graduates. Details of the methodology and results of the surveys along with the data analysis can be found below.

Survey 1: Alumni 2007–2019

In May 2020, a survey was conducted among the 2007–2019 graduates of the Design study programme at the Faculty of Architecture and Design at the Slovak University of Technology in Bratislava, Slovakia. The number of addressed alumni was defined by the number of awarded Master of Arts degrees. The structured online questionnaire, available through QuestionPro.com survey software, examined the reflection of design graduates on their own educational experiences, professional motivations along with knowledge, competencies and abilities

obtained during their design studies in comparison to their following professional practice. We realise that emphasis on the personal experience and thus a subjective point of view of surveyed graduates can lead to limited research results, but the value of their feedback was significant for further re-thinking of the design curriculum. All in all, with 353 graduates addressed by email and 49 emails not being delivered, the overall survey response rate was 22%.

Among 15 mostly qualitative questions, with the main aim described above – to empathise and understand the educational needs of FAD STU students from their perspective as recent graduates and young professionals – we focused on mapping their overall experience with design studies. Particular attention was paid to hard and soft skills. The survey identified the top three skills today's recent design graduates should master in order to find a job in Slovakia or abroad – whether as a self-employed designer or an employee. Among the top three preferred hard skills, design graduates gave preference to skills in CAD software and 2D programmes (approx. 70% of respondents), knowledge of production technologies and materials available on the market (65%) and design drawing (both analog and digital; 43%). However, respondents placed much more emphasis on the lack of soft skills.
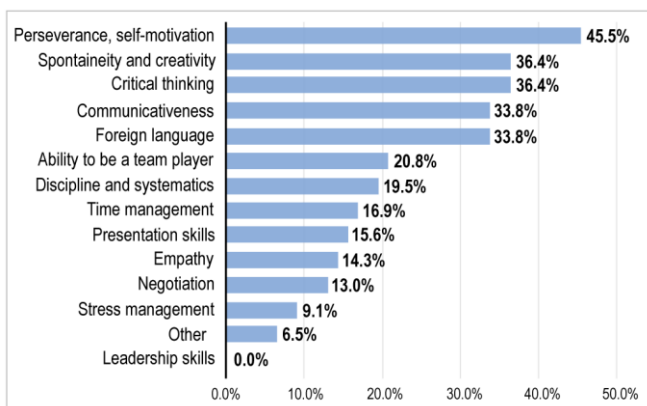
Fig. 1. Graduates' survey: What soft skills do you consider to be the top three for a young design professional? (Author: Pergerová, 2021)

As shown in detail in Fig. 1, among the top three soft skills graduates ranked perseverance and self-motivation (approx. 45% of respondents) first. They consider both spontaneity and creativity and critical thinking to be the second most important (36%), and the third place is shared equally by communicativeness and foreign language (approx. 34%). Under the option "Other" graduates stated intellect and originality, humility, business and marketing skills, networking and persuasion. Respondents further explained their experience in open-ended questions related to their struggles in the first years of practice. The insights were collected to understand deeper views, comments and feelings of students, revealing lack of soft skills cultivation during their studies. The feedback was gathered based on questions with open answers. A selection of answers below covers students' opinions on what was the most difficult thing after graduating in the first years of practice:

"For me it was definitely assertiveness at some point: to stand behind my own opinions and designs. Many companies accept young designers but offer terribly low salaries. It is often impossible to earn a living. We often do work that we do not enjoy. I think it would have helped me to gain more knowledge about how to start and run a business during my studies." (Anonymous respondent)

"Practically from the very beginning, I had to learn how to present myself better, how to work in a team and effectively manage other professions." (Anonymous respondent)

"It was hard for me to work 10 hours a day sitting and constantly bringing creative concepts. You need to be able to systematically plan your creative work so that you can tell the client the delivery date of the proposal. And, of course, the criticism. The designer receives criticism from everywhere. You need to be able to deal with it." (Anonymous respondent)

The questionnaire included, inter alia, questions concerning graduates' experience and recommendations for improving the design studies at the Faculty of Architecture and Design of the Slovak University of Technology in Bratislava, Slovakia. More than 50% of the respondents suggested broadening and expanding courses with professional soft skills. Knowledge of materials, surfaces and production technologies is constantly evolving, which is the reason the graduates suggested gaining more personal knowledge and skills (learning by doing). When being asked about suggested changes in design education, several answers were related to soft skills:

"It would have helped if I had had a lecturer who would help me find and develop what I was good at." (Anonymous respondent)

"Teaching with positive motivation rather than criticism." (Anonymous respondent)

"In creative subjects, I think it would help to support the design process, not just the orientation towards the result." (Anonymous respondent)

"There was a lack of teaching soft skills, advice on how not to burn out at work. I would appreciate if the teachers had led us more to teamwork, as well as personal time-management and systematic work." (Anonymous respondent)

Respondents also recommended to implement more interdisciplinary collaborations with other faculties, more projects with companies, to encourage more informal conversations between classmates and teachers from different areas to enrich the creative work.

Survey 2: Classes of 2019

Additional survey was conducted among students in their final years (4th and 6th year) of design studies in the bachelor and master study programme. The survey was conducted in 2019 during the submission period of the bachelor and master degree projects. The students were asked to subjectively rate their level of selected hard or soft skills on a scale from 1 to 10 (highest level) and then reflect on their educational experience in those categories in which they consider themselves to be less skilled (less than 5). In an open-ended question, they were asked to suggest some improvements to the educational process they wish to implement to achieve better personal results.

Although the methodology was different from the previously described alumni research, it led to comparable outcomes and recommendations. Students asked for more extracurricular workshops, competitions and internships. On the other hand, they self-reflexively declared that they are weak in time management and therefore are rarely able to participate in design contests. They named the need to focus on improving presentation skills, encouraging foreign language interaction, developing design thinking and including more lectures on design philosophy to support argumentation about the meaning and purpose

of creative concepts and the impact of design in society. Students also suggested focusing on practising professional communication in order to advocate for their creative concepts and learning how to make quick decisions in a dynamic world, followed by more opportunities to experience teamwork. Nevertheless, they felt strong (more than 8) in creativity and innovation, problem-solving, visual communication and considered themselves highly skilled in CAD software and prototyping.

Learnings from Profesia.sk dataset: Facts from the largest Slovak labour marketplace for the years 2008–2018

The data regarding the future of design education and the inevitable need to support soft skills cultivation not only in the Slovak labour market have been complemented with the statistics of Profesia.sk, the biggest job portal in Slovakia with overlaps to V4, as it expanded to Hungary (2006) and the Czech Republic (2007). For the purpose of our research, in Q1/2019, we asked them to provide us data concerning the development of job offers for designers over the last 10 years (2008–2018). The provided data enabled us not only to infer the development of the amount of design-related job offers, but also a list of required applicant's knowledge and skills.
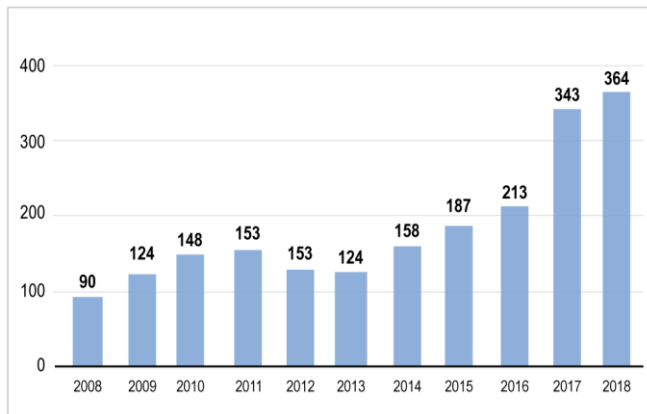
Fig. 2. In 10 years, job offers for designers have quadrupled. Number of job offers available for a "designer" (in general) 2008–2018 at Profesia.sk. (Author: Pergerová, 2021)
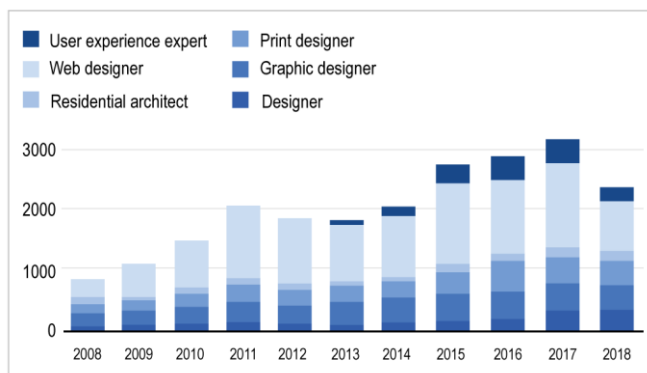
Fig. 3. Development of the number of job offers in specific design positions 2008–2018. (Author: Pergerová, 2021)

Despite the fact that between 2008 and 2018, the position of a "designer" was still mainly hard-skill oriented, the advertised positions increasingly demanded good communication skills, independence and responsibility, as well as analytical or logical thinking or resistance to stress from applicants. This could be due to the fact that product or interior designers in Slovakia mostly start their own business and tend to work alone or in small teams, without the need to hire staff, while the majority of

positions at Profesia.sk is advertised mostly by small and medium enterprises that can afford to hire specifically focused workers – drawers of technical documentation, 3D modellers, web designers or often DTP or graphic designers (Fig. 2, 3).

CURRICULUM REDESIGN PROCESS

The key outcome of the above-described research for the redefinition of the study programmes at FAD STU was a matrix of the target competencies, shown in Fig. 4. The matrix introduced 3 foundational competencies (for the sake of easier communication within working groups labelled in a simplified way as "thinking", "aesthetics", "making"), and 3 advanced competencies (labelled as "interdisciplinary", "professional" and "digital" competencies). The aim of the matrix was to illustrate the hierarchy of the competencies and the logic behind the distribution of their training across the study years (Fig. 5). To explain the matrix in more details, the meaning of the simplified labels of the target competencies was as follows:

THINKING – foundational competency – the ability to independently use the methodology of the design process in favour of creativity and innovation, familiarity with the tools and methods of design thinking, the ability of critical reflection,

AESTHETICS – foundational competency – the ability to use the tools of fine arts in favour of communicating own ideas, practical knowledge of visual communication skills,

MAKING – foundational competency – the ability to create tangible representations of ideas, such as models or prototypes, practical knowledge of materials and production and prototyping technologies, including the awareness of product life cycle and its environmental impacts,

DIGITAL – advanced competency – the ability to use software tools beyond the basic computer literacy, the use of 2D and 3D digital technologies for representation and production of one's ideas, the ability to use the digital tools for creative expression or for creating own design process or methodology,

PROFESSIONAL – advanced competency – the umbrella term of "professional competencies" was created to compound the set of competencies necessary to adapt in the changing workspace of the future (communication and interpersonal skills, presentation skills, project management and teamwork) as well as to include the need to gain experience from connection to the industry as early as during the study years,

INTERDISCIPLINARY – advanced competency – the umbrella term of "interdisciplinary competencies" places a roof on specialized knowledge of humanities, social and technical sciences, necessary for a holistic approach to product development, differing based on the chosen specialisation of the individual student.

The difference between "foundational" and "advanced" competencies was mainly in the obligation and voluntariness of their adoption. While foundational competencies were all defined as obligatory, the advanced competencies were defined as subject to each student's choice and individual specialization. The necessary part of the advanced competencies was obligatory, but the extent to which the student was interested in mastering them was a matter of individual decision.

Within the bachelor and master study programmes of design, the whole curriculum redefinition process took the form of a series of participatory sessions within six working groups, coordinated by Michala Lipková and Zuzana Pergerová. The coor-

dinators designed six working groups according to the outcomes of the research, considering the key target competencies of future designers as well as the core focus of the then existing courses. Every working group was supervised by one of the five expert guarantors of the affected study programmes, who were at the same time appointed as responsible for the administration of the final definition of the bachelor and master study programmes:

1. Working group Design Studio Courses (supervised by professor Veronika Kotradyová) – the "THINKING" and "professional" competencies,

2. Working group Art Disciplines (supervised by associate professor Milan Lukáč) – the "AESTHETICS" competency,

3. Working group Workshops and materials (supervised by associate professor Peter Daniel) – the "MAKING" competency,

4. Working group Humanities & Social Sciences (supervised by associate professor Branislav Jelenčík) – the "INTERDISCIPLINARY" competency,

5. Working group Technical Sciences (supervised by associate professor Branislav Jelenčík) – the "INTERDISCIPLINARY" competency,

6. Working group Digital skills (supervised by associate professor Martin Uhrík) – the "DIGITAL" competency.
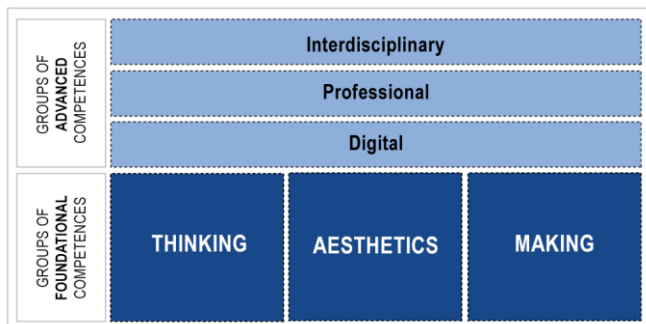

Fig. 4. Target competencies matrix for the design study programme. (Author: Lipková, 2021)
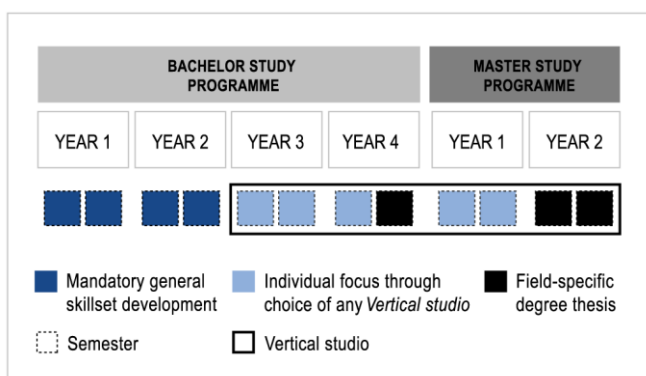

Fig. 5. Distribution of the target competencies training across the bachelor and master study programmes. The icons on the right-hand side represent possible individual specialisations of the students through the development of the unique set of competencies – illustrated on examples of interior design, automotive design or experience design. (Author: Lipková, 2021)

Over the course of 3 months from March to May 2021, the working groups were regularly meeting in an online setting (due to pandemic restrictions). The goal of the sessions, facilitated by

Michala Lipková and Zuzana Pergerová, was to reconsider the existing study programme structure, discuss and agree on possible adjustments to meaningfully distribute the target competencies across the bachelor and master study programmes. The process resulted in significant changes in the bachelor and master study programmes which were implemented and became active from September 2021/22 and are still in operation at the time of publishing of this paper.

PILLARS OF THE NEW APPROACH

Based on the surveys, literature research and discussions in the working groups, the ambition of redefining the learning experience in the bachelor and master study programmes was not only to modify the formal structure of the obligatory and elective courses, but also their actual content, used learning formats and the teaching approach. Besides integrating previously discussed focus on the development of soft skills and a client-oriented approach through practice-based collaborations within the project-based learning in the Design Studio courses that will be described in detail later, the "philosophical" layer of the new approach suggested the following three new approaches to design education:

1. the idea of nonlinear learning;

2. the concept of the student as the critical agent in the learning process; and

3. the emerging new roles of the design tutor, closely related to the innovation of the regular teaching formats (e. g. lecture, seminar).

The selected strategies, which are described in detail below, were selected firstly because of their resonance within the working group discussions, secondly because of their presence in the contemporary international discourse and lastly because of their claimed ability to cultivate the skills, confirmed as lacking in the curriculum by the previously described surveys carried out by Zuzana Pergerová.

Pillar 1: Nonlinear learning

Nonlinear learning is not a new educational concept. To feature two examples of this approach, both of which arose at the turn of the centuries, the concepts of rhizomatic learning and connectivism will be compared. The metaphor of rhizome is derived from the eponymous designation in botany, where rhizome is defined as a set of horizontal underground stems (or roots) of a plant, capable of producing shoots and new plant root systems (Britannica, 2018). It does not consist of units; it is defined by direction and range. The concept of rhizome questions the hierarchical arrangement and binary understanding, it represents a plurality of ways in which an idea or solution approaches a certain problem. As a philosophical concept, Deleuze and Guattari understand rhizome as a plurality without beginning and end, without logical structure and rules (Deleuze, Guattari, 1980).

In the same way as in rhizomatic learning, the pedagogical model of connectivism, introduced in the first decade of the 21st century in the texts of Siemens and Downes, seeks a closer understanding of learning in the digital age, integrating principles related to theories of chaos, networks or self-organization. Connectivism sees knowledge as a network and learning as a process of pattern recognition. Siemens emphasizes the attention that connectivism pays to the impact of technology on our lifestyles, communication and subsequently on our learning (Siemens, 2005). In his very first article on connectivism, Downes

has used the term "connective knowledge", which, according to him, arises from the public participation of a number of actors, as exemplified by the open encyclopaedia Wikipedia. Downes defines four characteristics of educational networks: diversity of opinions, independence of individual members, their mutual interaction and openness of the whole system (Downes, 2005).

Pillar 2: The student as a critical agent

The concept of the student as a critical agent in the learning process reacts to the question of values and ethics. The concept of critical pedagogy, pioneered by Brazilian author Freire in 1970 with his book Pedagogy of the oppressed, criticized mechanical processing of „inserted knowledge" and „automated knowledge transfer", emphasizing the need for students to be conscious actors in their own development (Freire, 1970). Similarly, the aim of the emancipation method in design education is to activate students' ability to acquire knowledge and learn independently, to ask students questions and to challenge them (Černe Oven, Predan, 2015). Through their work, product designers actively respond to the social context, whether it is the choice of material, the chosen technology or the method of production of the proposed object, etc. Taking into account that few of these aspects can be taken out of the wider social, economic or political context, the application of dialogical and emancipation methods, typical for critical pedagogy, can be considered as an essential part of design education.

Pillar 3: New roles of the design tutor

The proposition of the new roles of the design tutor suggests that being an expert designer is no longer the most important role of the tutor in the position of leading project-based design education. As the previously described surveys and literature research confirmed, artistic and technical expertise as the sole focus of higher design education alone is not adequate anymore. While the position of industry expertise and the sharing of professional experience undoubtedly provide an important added value to the educational process, product design curriculum – and the Design Studio courses especially – is expected to provide a broader range of skills.

To provide relevant training for the expected set of target competencies (Fig. 4), the approach to leading the design process needs to diversify accordingly, whether by retraining the existing staff, or more realistically, by involving a range of different experts through so-called "team teaching". According to Roth, this is a standard requirement for each course at Stanford's d.school and supports multidisciplinarity, richer student experience, and diversity of opinions (Roth, 2015, p. 150). The personal coaching or mentoring, the curation of information sources (Černý, 2019), the facilitation of the design process (Manzini, 2015), or complete co-creation (Jansen, Pieters, 2017) need to be emphasized among skills required to be provided by the design tutor in the 21st century design education.

IMPLEMENTATION OF NEW LEARNING EXPERIENCE

While the change of the formal structure is easy to claim and document, the implementation of the new teaching and learning approaches, which are directly dependent on both tutors and students, is a much greater, long-term challenge that needs to be evaluated in a qualitative way after a sufficient period of time. Implementation of the revised study programmes started in the academic year 2021/22, only entering a second academic year in operation at the time of publishing of this article. Since we consider this timeframe to be too short to fully evaluate the impact of the changes, the following sections will focus on describing three examples of implementation of the curriculum adjustments, that illustrate the most significant changes in the new learning experience:

1. adjustments to the foundational Design Studio courses in the first two years of the bachelor study programme;

2. the methodology implemented in MX lab, one of the faculty's vertical studios;

3. and the concept of the newly created Design Studio Seminar courses.

Lastly, the final section of the paper will discuss the challenges that emerged along with these interventions and will suggest steps that need to be taken to fully enable the implementation of the new learning experience concept.

Foundational Design Studio Courses

The learning experience within the first and the second year of the bachelor study programme of design at the FAD STU was designed to place emphasis on acquiring the foundational skills (Fig. 4) of THINKING, AESTHETICS and MAKING, as described in the previous sections. The new content and structure of courses focused on basic knowledge of materials, production technologies, and the use of software tools was rearranged to better support the first four Design Studio courses I-IV, which students take as a whole group under the supervision of a stable teaching team.

Complimentary team teaching in the first two years has been specifically assigned to develop critical thinking. Strong focus on hard skills, being naturally cultivated right from the beginning of the studies, has been complemented by a second lecturer. The teaching tandem shows the students how diverse approaches supplement each other, broaden horizons and that different opinions force us to argue correctly, objectively, and pragmatically. Students experience various statements and learn to analyse, evaluate, and interpret arguments and take responsibility for their decisions.

Vertical studio example: MX lab

After the first four terms, the students at FAD enter the so-called vertical studio. The concept of the vertical studio is based on a cross-class teaching approach of the key Design Studio courses, where students of the 3rd and 4th class of the bachelor programme study together in one group with the 1st and the 2nd year students of the master degree programme. Students can choose from a variety of studios and are able to change them every term. Since the offer of the places in each studio is limited, students get the chance to experience the competition when applying, in a way similar to the job market.

Vertical studios can be again team-taught, by the group setup they naturally promote peer learning, teamwork and, above all, project-based learning. Among the suggested didactic concepts, the earlier mentioned White Book on the Future of Design Education lists the teaching format of a laboratory: *"focus on very limited content that has to be explored in more depth on a step-by-step, practice-oriented basis; the experimental side of this format liens in addressing themes that are new or on the periphery of the curriculum so that their sustainability for the course programme can be tested initially"* (Böninger, Schmidhuber, Frenkler, 2021, p. 160).

In this fashion, the MX lab vertical studio, with the abbreviation referring to "multidisciplinary research" and "experience design", was founded to create a platform for experimenting with

the emerging tools of digital design, dematerialized design processes and intangible forms of design in the field of automotive interior design as well as mobility in a wider sense. In addition to providing a hands-on experience with emerging technologies, the laboratory explores objectification of the design process. The lab maintains a vivid contact with the automotive industry and the project-based learning in all classes derives from industry assignments.

During the term, students solve open-ended tasks, carry out user research and consult their findings and next steps directly with industry experts. The curricula are not directed by predefined inputs from the expert but are rather co-created in real time by the contributions of those participating in the learning process – the community shapes the curriculum of the educational process in the same way that the rhizome responds by adapting its structure to the stimuli of the external environment (Cormier, 2008). In this sense, the fluid "rules" of rhizomatic learning, without a fixed beginning and end, allow the student to become the driving force of the learning process.

By providing the opportunity for promotion or internship placements at industry partners, the lab helps the students develop their strengths, identify the weaknesses and understand their role in the wide spectrum of design specialisations, directly in real life confrontation with labour market demand. The lab works with strong emphasis on self-management and development. One of the methods to help students shape one's professional programme is a systemic goal setting (e. g. through the Design Compass tool, see Lipková, 2021, p. 35) and reflection within course evaluation (1:1 mentoring with the tutor). Students are asked to take control of their professional lives by their personal assignment modifications, goal setting, improvement suggestions. Roth, one of the d.school founders, describes the method of achieving the habit of results delivery (Roth, 2015, p. 150). The hidden message of this approach is the necessity to take personal responsibility for one's own success.

Design Studio seminars

The concept of the Design Studio seminars was present in the design studies at the FAD STU well before the implementation of the adjustments. The change that was introduced was an increased consistency throughout the studies – in the updated programme, every Design Studio class has a collateral seminar that provides supporting methodology; and increased alignment within the content delivered in the seminars with respect to the focus of the collateral Design Studio courses in the same class. Seminars provide methodical support of all Design Studio courses, with increased intensity in the first two years, when the Design Studio courses focus on developing creativity and critical thinking (1st year), and feasibility within limited material groups such as plastics and metals (2nd year). In the years that are devoted to participation in the vertical studio, which provides the students with the space for individual development, the seminars focus on deepening the professional competencies, such as design research, teamwork and academic writing. The seminars aim to create an atmosphere of mutual peer-support, courtesy and favour.

CONCLUSION

The contemporary models of higher education still carry a strong legacy of the linear approach, headed towards a fixed destination. The goal of design education in the bachelor and master study programmes in the field of Design should be to acquire a set of competencies and skills needed by the industry, whether from the perspective of an employee or a freelance designer. As argued earlier in the text, these core competencies

are no longer possible to be defined as a constant, but rather as moving targets in an uncertain future (Böninger, Schmidhuber, Frenkler, 2021, p. 118). Designer's skills need to be expanded to include the skills of the 21st century which, according to the conducted surveys and gathered quantitative data, are identified as essential soft skills, self-management, complex problem-solving, teamwork, and critical thinking. By claiming this, the authors do not neglect hard and technical skills, but call for an equilibrium and enriching one's professional competencies with cognitive and personal capabilities that are gaining importance in the era of automation and digitalization towards Industry 4.0. After implementing the described adjustments in the study programmes in the academic year 2021/22, the following challenges were collected based on the direct experience of both course tutors and students:

Nonlinear learning requires the shift to more interactive, participatory and flexible learning formats, ones that encourage individual definition of personalized learning goals, along with peer knowledge exchange, curation and verification of information sources, and one that supports student's future ability of autonomous learning. This shift raises a need for agile and interactive learning platforms, their effective moderation and technical maintenance. Student as a critical agent calls for increased emphasis on supporting student's individual critical approach to a wide spectrum of topics in a contemporary social, environmental and political context, through building the culture of dialogic discussion in all courses with an interactive teaching format. New roles of the design tutor can only be enabled by diversifying the personal structure of the institutions of higher education, including hiring experts with professional profiles beyond the traditional academic experience. The above listed challenges suggest that a full implementation of the new approach to design education at the FAD STU still requires – alongside the still needed updates in the content of the courses – indeed the systemic changes at several organisational levels of the institution as such. With the gradual progress of these changes, the authors plan to collect regular feedback from all involved parties for future reflection and evaluation.

Acknowledgements

References

Böninger, Ch., Schmidhuber, S., Frenkler, F. (2021) 'Designing Design Education: Whitebook on the future of Design Education'. iF Design Foundation, Stuttgart, Germany.

Černe Oven, P., Predan, B. (2015) 'Design Education: What do you see? What do you think about it? What do you make of it?' University of Ljubljana, Ljubljana, Slovenia

Černý, M. (2019) 'Digitální informační kurátorství jako univerzální edukační přístup' (Digital information curation as a universal educational approach). Masaryk University, Brno, Czech Republic. ISBN 978-80-210-8662-3 (in Czech)

Cormier, D. (2008) 'Rhizomatic Education: Community as Curriculum.' Innovate: Journal of Online Education, 4(5), Article 2. [online] Available at: https://nsuworks.nova.edu/innovate/vol4/iss5/2 (Accessed: 4 Jan 2021)

Deleuze, G., Guattari, F. (1980) 'A Thousand Plateaus. Capitalism and Schizophrenia'. University of Minnesota Press, Minneapolis, USA, pp. 3–25

Downes, S. (2005) 'An Introduction to Connective Knowledge'. In: Hug, T. (ed.) (2008) 'Media, Knowledge & Education: Exploring new Spaces, Relations and Dynamics in Digital Media Ecologies'. Innsbruck University Press, Innsbruck, Austria, pp. 77-102. [online] Available at: https://www.downes.ca/cgi-bin/page.cgi?post=33034 (Accessed: 10 Jan 2021)

Britannica (2018) 'Rhizome'. [online] Available at:
https://www.britannica.com/science/rhizome (Accessed: 2 Jan 2021)

FAD STU (2021) 'Fakulta architektúry sa mení na Fakultu architektúry a
dizajnu STU' (The Faculty of Architecture is changing to the Faculty of
Architecture and Design of STU), Bratislava, Slovakia. [online] Available
at: https://www.fa.stuba.sk/sk/dianie-na-fakulte/aktuality/fakulta-
architektury-sa-meni-na-fakultu-architektury-a-dizajnu-stu-fad-stu.html
(Accessed: 21 Nov 2022) (in Slovak)

Freire, P. (1970) 'Pedagogy of the oppressed'. Continuum, New York, USA,
ISBN 0-8264-1276-9, pp. 75–79

Haselberger, D., Oberhuemer, P., Perez, E., Cinque, M., Capasso, F. (2014)
'Mediating Soft Skills at Higher Education Institutions: Guidelines for
the Design of Learning Situations Supporting Soft Skills Achievement'

Jansen, S., Pieters, M. (2017) 'The 7 Principles of Complete Co-Creation'. BIS
Publishers, Amsterdam, Netherlands. ISBN 978 90 6369 473 9

Lipková, M. (2021) 'DIZAJNÉRSKY KOMPAS: Nástroje a metódy dizajnérske-
ho výskumu v akademickom prostredí' (DESIGN COMPASS. Tools and
methods of design research in academic environment). Spektrum STU,
Bratislava, Slovakia. ISBN 978-80-227-5105-6

Manzini, E. (2015) 'Design, When Everybody Designs'. MIT Press, Cambridge,
USA. ISBN 9780262028608

Norman, D. (2010) 'Why Design Education Must Change'. [online] Available
at: https://www.core77.com/posts/17993/why-design-education-
must-change-17993 (Accessed: 13 May 2021)

Petránsky, Ľ. (1997) 'Dizajn na FA STU' (Design at FA STU). Publishing house
STU, Bratislava, Slovakia.

Roth, B. (2015) 'The Achievement Habit'. HarperCollins, New York, USA,
p. 150

Seery, N., Canty, D., O'Connor, A., Buckley, J., Doyle, A. (2016) 'Identifying,
developing and grading soft skills in design and technology education:
a methodological approach.' In: Proceedings of the 32nd Pupils' Attitude
Towards Technology (PATT) Conference, Utrecht, Netherlands.

Siemens, G. (2005) 'Connectivism: A Learning Theory for the Digital Age'.
In: International Journal of Instructional Technology and Distance Learn-
ing, 2(1). [online] Available at:
http://www.itdl.org/Journal/Jan_05/article01.htm (Accessed: 4 Jan
2021)

Talbot, D. (2011) 'The Problem with Design Education'. In: MIT Technology
Review. [online] Available at:
https://www.technologyreview.com/2011/04/06/195924/the-
problem-with-design-education/ (Accessed: 12 May 2021)

U.S. Department of Labor (1992) 'Learning for living: A blueprint for high
performance'. [online] Available at:
http://wdr.doleta.gov/SCANS/lal/lal.pdf (Accessed: 19 Nov 2022)

Whiting, K. (2020) 'These are the top 10 job skills of tomorrow – and how
long it takes to learn them'. [online] Available at:
https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-
tomorrow-how-long-it-takes-to-learn-them/ (Accessed: 14 May 2021)

World Economic Forum (2020) 'The Future of Jobs Report 2020'. [online]
Available at: https://www.weforum.org/reports/the-future-of-jobs-
report-2020 (Accessed: 15 May 2021)

Potential contribution of design in strengthening the regional identity in Southern Slovakia

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Abstract: The article deals with the phenomenon of the disappearance of cultural identities of regions in the Slovak Republic and presents potential design solutions and strategies that can positively influence the quality of public space, inspire and increase innovation in the region. The gradual loss of cultural identity is an unfortunate but an all-too-common reality in many regions of Slovakia. The studied regions of Hont and Novohrad are no exception: here the situation of regional awareness is even lower as a result of the historical development of the area. This is further evidenced by the frequently changing and fluid nature of the boundaries of these specific territorial units. This paper argues that regional identity is alive but constantly changes over a period of time. Identity is affected by various natural and social factors, including climate changes, population aging, and others. Nevertheless, the authenticity of the original culture is often suppressed at the expense of the aforementioned changes. Sadly, only a few regions are able to develop and maintain their traditional cultural heritage under these conditions. However, with the assistance of modern technologies, designers are able to use creative and systematic processes for the positive development of regional culture. This can be illustrated by various foreign organisations and projects such as the Werkraum Bregenzerwald. The regions under investigation have a specific design language which is characterised by a unique morphology and material composition. Although, in order to reveal these signs and the very identity of the region, it is necessary to establish a contact with the local government, the local population and active cultural associations. The cooperation of interested parties in the form of participatory design is a key aspect in order to revive the existing elements of folk culture into a sustainable form with the character of local culture.

Keywords: region, cultural identity, traditional and folk crafts, Slovak regional design

INTRODUCTION

The design community believes that the traditional Slovak and folk culture is often limited to a few basic attributes within the consciousness and even the subconscious of the Slovak people. These attributes have become the identifiable and characteristic symbols of Slovakia, both in the regional and immediate international context. These symbolic elements have become generationally engrained symbols that are linked to specific natural elements, for example: the geomorphology of the country (the iconic Tatras mountain range), its folk architecture (such as the log houses in Čičmany), even the traditional gastronomy (dish halušky, restaurants Salaš) (Beňušková, 1998). However, Slovakia has a much greater cultural wealth that deserves greater recognition and celebration. Considering the geographical location of Slovakia, there could arguably more easily emerge colourful and internally diversified cultural regions. However, the identity of the tangible and intangible cultures of Central Europe is not clear-cut and thus, in many cases the identities are largely polarised. This phenomenon is noticeable both in the higher and lower territorial administrative units of countries such as macro and micro scale regions. The specific character of the culture of Slovakia's regions was primarily influenced by the historical development of the given area, accompanied by the alternation of political regimes as well as the influence of various cultural ethnicities, whose presence caused the frequent transformation of state borders along with the consequent migrations (Kotradyová, Borysko, Lipková, Daniel, 2018).

With the intention of simplifying the implementation of the state administration, the area underwent a territorial-legal division which subsequently resulted in the creation of territorial units in the form of regions. However, this division did not always prove to be appropriate. There are regional and cultural overlaps in many territories. This creates a situation where the individual does not mentally identify with the area in which they are located, while the larger local population loses a sense of regional identity and belonging. This phenomenon is clearly manifested in the studied regions of Hont and Novohrad where, due to the frequent shifting of the southern border (until 1925 when the border with Hungary was definitively established), the Slovak and Hungarian nations were mixed into one population. Therefore, the southern areas of the regions are mostly made up of peoples and communities with a more pronounced Hungarian ethnicity. Similarly, many villages with Slovak ethnicity have

been preserved in the northern part of Hungary. In the area near the border, an alternation of juxtaposed Slovak and Hungarian municipalities can be observed (e.g. Príbelce, Hrušov – predominantly Slovak-speaking population, Čebovce, Kosihovce – predominantly Hungarian-speaking population). The mutual influence of the Slovak and Hungarian population of the given locality resulted in a similar, sometimes even identical way of life and cultural characteristics. Certain differences, though, are noticeable in folklore and artistic expressions (Beňušková, 1998).

According to the normative position of this author, the argument could be made as follows: Residents thus do not feel whether they are Slovak or Hungarian and, consequently, the regional awareness of Hont and Novohrad is low compared to the surrounding regions. Nevertheless, the investigated territory is a valuable source of tangible and intangible cultural heritage. Its proper consideration and development through the creative activity of the designer can lead to the economic development of the regions. Numerous foreign organisations and projects illustrate this phenomenon. It is possible to use other functional methods of regional development, transform them and adapt them as needed. However, the process requires to follow up on an existing cultural heritage with development potential that the population identifies with and personally considers as part of its identity.

The article focuses primarily on the traditional folk culture of Slovakia and its regional contribution through creative activity. Specifically, this article concentrates on the regions of south Slovakia, like Hont and Novohrad. For this reason, it is necessary to define the term region. Although, the term region has several definitions. According to V. Lauko and O. Bašovský (1990), the region is *"a complex dynamic spatial system that arose on the earth's surface based on the interaction of natural and socioeconomic phenomena."* (Bašovský, Lauko, 1990, p. 118). In other words, a region is a geographically separated area of the state, which has been shaped into its current form by various geological, geopolitical and socio-cultural factors. As a result of these influences, a unique regional culture with a specific tangible and intangible heritage was created. Thus, the region has a unique cultural identity that shapes its material culture.

The regional culture as well as the identity of a particular part of the country evolves over time, it is not immutable and static. Its shapes are changing. It is a living entity influenced by various natural and social factors such as population aging, migration, representation of mineral resources, climate changes, changes in political regimes, modernisation and others. Changes are therefore natural in the given case and in many aspects necessary to maintain its viability. However, the mentioned factors can also work against the region and cause its degradation. Currently, it could be argued that there is a gradual disappearance of folk culture in many localities throughout Slovakia, despite its diversity and uniqueness. The regional awareness of the inhabitants as well as their identification with a specific place is disappearing. The diversity of the characteristics of individual regions is thus unknown to many, even though, these are usually values surrounding the society. This is a situation where even important cultural signs are overlooked, until finally they disappear. Currently, the trend of globalisation is also dangerous. Despite its positive intentions of global economic growth and international connectivity, with the aim of raising living standards and alleviating poverty, globalisation also has an adverse effect on the diminishing of cultural differences and obscuring the boundaries of regional identity (Kotradyová, Borysko, Lipková, Daniel, 2018).

It is the maintenance of regional specifics that ensures uniqueness and differentiation, which supports the economic and social development of the territory. Therefore, it is necessary to inform society about the importance of its existence in an adequate way. Various professional monographs were created in order to highlight and preserve the cultural values of some regions. For instance: Hont, Horehronie, Ľudové staviteľstvo na Kysuciach, Podzišovské Hrnčiarstvo and others. It is a complex processing of information obtained from various sources about the local specifics of the way of life. Important publications also include regional anthologies or professional journals (Beňušková, 1998). However, based on the current state of Slovak folk culture, it is clear that publications and local initiatives are not sufficient. This current degradation is also due to a gradually declining and disappearing older population, who are the owners of the cultural heritage. Additionally, there is a lack of interest and value placed on these traditions by young people since they do not see the future in the craft as a source of livelihood. Hence, regional cultures and traditions will gradually disappear. New possibilities arising from modern technologies lead to the emergence of new customs that suppress the authenticity of the original culture. The overall process of vanishing of folk culture is also accelerated by the current way of life, inappropriate approach, absence of creative processes and a lack of public initiatives.

ROLE OF DESIGN IN PRESERVING CULTURAL IDENTITY

The anticipated research builds on and continues with the ideas of the research APVV project 'Identita SK' (platform of design, architecture and social sciences). The aim of this project was to map the existing and living cultural heritage of various locations in Slovakia, while taking into account its potential for further development. The very result of the project consisted in building an extensive database of elements with a regional identity, from folk architecture to crafts, materials and their products. The mentioned research thus ensured the creation of various workshops, new design of products, concepts and educational studies, which will serve as examples of good practice in the given field and as sources of inspiration in the following course of research. The ongoing research endeavours to explore the possibilities of a much wider application of design in regional development and designing within an ecological, and even the social context. At the same time, this research aims at promoting various strategies and concepts to support new forms of tourism and other business in the regions, the creation of regional products and domestic production, as well as the development of new complex services (BCDlab, 2017).

Werkraum Bregenzerwald

An ideal example of the positive influence of design and creative activity in favour of regional development is the globally recognized association Werkraum Bregenzerwald (Fig. 1, 2). It is an asso-ciation made up of several members representing various trades and crafts, such as carving, carpentry, metalworking, plumbing, upholstery, construction, shoemaking, goldsmithing, just to name a few. Some members are both product and graphic designers, and other members may even provide completely different services. The primary mandate of the association is to support the economic and cultural development of the region. This organisation strives for the sustainable development of crafts and trade through the preservation of and creation of new jobs, local production of sustainable products and their subsequent distribution, the preservation of quality crafts and the creation of intimate relationships through cooperation between craftsmen and designers. The programme also

involves the organisation of thematic exhibitions, workshops, competitions and lectures on crafts and local architecture as well as the presentation of products from the workshops of member companies. Many of the mentioned events take place in the common and multifunctional space of the Werkraum building which is located in the Austrian village of Andelsbuch. This space also serves as an exhibition space, shop and consulting centre (Grosse, 2019).

Educational programmes for children and youth are also an important part of the association's programme in terms of preserving the craft tradition and culture for future generations of the region. There are projects for all age groups – from kindergartens to various forms of higher education. One of the educational facilities is the Lädolar exhibition and mobile learning space. It is a portable container that serves to present individual crafts in the form of interactive portable boxes including tools, technologies and materials related to a specific craft. The Lädolar centre is under the supervision of craftsmen and workshop apprentices who provide varied and lively forms of presentation, school training in connection with individual employment together with questionnaires and information materials. They thus provide basic information about education and career prospects for future generations.

Fig. 1. Depot of Werkraum Bregenzerwald with the reception in the background. (Photo: Peter Daniel, 2018)

Fig. 2. Products of Werkraum Bregenzerwald with the reception in the background. (Photo: Peter Daniel, 2018)

Similar foreign projects

The Polish platform Design Silensia has the main goal to familiarise entrepreneurs, municipalities, the academic and scientific community with the topic of design and to support the implementation of innovations through design. This platform actively promotes design as an element of the transformation of the Silesian Voivodeship region. The first year of the Design Silesia project proved that the demand for design in the Silesian Voivodeship is growing and is an essential tool in building the region's innovations. The platform involved several field studies, publication activity, organising of exhibitions, conferences, educational courses and popularization events (Samorząd Województwa Śląskiego, 2012). The project Design Silesia lasted until 2013 and positively influenced the development of regional culture. The cooperation of various regional institutions contributed to the emergence of a new quality, both economic and social, which persists to this day.

The Sploty na fali project seeks to support the cooperation of basketmakers and students of the Academy of Fine Arts (Wydzialem Form Przemyslowych ASP) in Krakow, Poland, with the intention of reviving the traditional basket craft through design and designing of contemporary objects based on conventional techniques. The idea behind this strategy is to make the ancient techniques and products more attractive to a modern audience. Moreover, it is appropriate to mention the projects focused on the identity of Central European regions - Common Roots: Design Map of Central Europe and Central Values - Common Herit-

age in Contemporary Central European Design. The aim of the projects was to remove a possible connection between the creation of individuals as members of the entire European region and the mapping of a common cultural area (Kotradyová, Borysko, Lipková, Daniel, 2018). During three meetings, participants of the project got acquainted with materials such as cane, straw and wicker. Subsequently, based on traditional weaving techniques, they designed products for a new purpose and with the addition of non-standard materials (Zamek Cieszyn, 2017).

Examples of maintaining traditions in Slovakia

A few months after the end of the war production, in 1945 The People's and Art Centre (ÚĽUV) was founded directly through the decree of President Beneš. Since the establishment of the decree, national folk production has been under the control of the ÚĽUV. In February 1948, after coercive actions and subsequent elections, the communists took over the government in the state. In Czecho-Slovakia there was a period of the so-called of "people's democracy" under the rule of the Communist Party. The era of socialism subsequently gradually destroyed the economic system as well as the country's culture. At present, however, the political situation is different and ÚĽUV (The Centre for Folk Art Production) thus tries to preserve and develop folk culture in Slovakia through artistic activity, and this without significant problems.

The aim of the organisation is to document, protect and spread the knowledge of Slovak cultural identity in terms of preserving it for future generations. Among the main activities of ÚĽUV is the documentation of traditional crafts and folk products as well as the care of collections and documentation funds throughout Slovakia. The traditional folk craft of the society is introduced through publishing activities, organising exhibitions and festivals. An important space is also reserved for the workshops where individuals come into direct contact with the material and create products based on traditional techniques, under the guidance of the expert supervision of craftsmen. Workshops are an ideal space for the presentation of crafts and their wide range of uses (ÚĽUV, 2022).

Keeping a database of producers and proper documentation of contemporary folk art provides an important cross-section and reference guide for the possibilities of craft production in Slovakia. Based on the prepared databases, another effort of the organisation is to create a point of contact between the craft and the sphere of artistic creation. Through its activities, it thus contributes to the cooperation of craftsmen with artists and designers. Thanks to this cooperation, there is a mutual transfer of knowledge and skills which has a positive effect on newly created products in the form of innovations as well as preservation of the craft production traditions (successful cooperation with designers like Janka Menkynová, Ľubica Poncik, Michal Hanula, Martin Hartiník, etc.). Subsequently, this organisation also maintains a level of quality and oversees the maintenance of the traditional material design as well as preservation and recording of the techniques of their production process.

A good example of contribution to the creation of new products inspired by traditional crafts is the design competition organised by ÚĽUV – Kruhy na vode (Rings in the water). The competition is a space for the generation of new applied art and design which attempts to preserve the traditional values of craft production. Kruhy na vode is similar to the Handwerk + Form competition organised by the aforementioned Werkraum Bregenzerwald. Nevertheless, Kruhy na vode is not exclusively tied to a specific location. The works receive internationally recognised award (Fig. 3) and the possibility to be sold under the ÚĽUV brand. Through the competition, it is possible to distribute the works on the market and to make them visible as well as to maintain the identity in modern products of daily use (SAShE, 2018).

This kind of preservation of traditions through modern design can be seen in the work of designer Jakub Liška (Fig. 4). After completing his studies, Jakub Liška continued with the pottery tradition of his father and later founded the company Modranska. His intention was to revive the tradition of Modra ceramics through new techniques and production procedures. With the use of new morphology and graphic processing of the decoration (by adding new patterns), he also created a modern type of utilitarian majolica with a group of collaborators (Bohunický, 2018). The development of folk art is natural and influenced by many changes over time. However, these changes are necessary for its maintenance, as can be seen in the work of Jakub Liška. Thanks to modernisation, ceramics have become attractive for today's generation. The Modranska brand is one of the popular products in Slovakia as well as abroad. Expansion at an international level is of great importance in preserving, consolidating and especially sharing and celebrating cultural heritage (Bohunický, 2018).

Fig. 3. Competition Rings in the Water - 2nd Award, Miroslav Mládenek, bowls Hlavy (Heads). (Photo: Peter Simoník, 2016; Source: ÚĽUV, 2016)

Fig. 4. Jakub Liška in Modranska. (Photo: Magdaléna Tomalová for Milk, Source: Kóňa, 2020)

RESEARCHED REGIONS: HONT AND NOVOHRAD

Based on a survey of foreign as well as domestic tendencies in the field of regional development, the contribution further focuses on the possibilities of implementing design and creative activity in a specific area of the regions of Southern Slovakia (Fig. 5). The area of interest is also referred to as Poiplie, as it is a region located along the Ipeľ River. Poiplie is formed by the regions of Hont and Novohrad. The name comes from former Hungarian counties that in turn got their designation on the basis of administrative county centres, which were in Hont – Hont Castle (a defunct castle in the village of Hont on the territory of today's Hungary, near the Hungarian-Slovak border) and in Novohrad – Novohrad Castle (on the territory of today's Hungary). In the past, as county units, they occupied a much larger territory. In 1918, the counties were divided by the state border with Hungary which was definitively established in 1925 (Brloš, 2009). The southern parts of the historical counties are thus located on the territory of today's Hungary. The Hont County is a smaller area made up of 19 municipalities along the Slovakian-Hungarian border. Novohrad County was divided into two units of almost equal area, Veľký and Malý Novohrad, while Malý Novohrad became a part of Hungary.

For this reason, the northern parts of the regions are predominantly made up of the population of Slovak nationality, while the Hungarian ethnic group is predominant in the southern regions. In Hont, for instance, the northern border of the Hungarian ethnic settlement is formed by the line of the villages of Hontianska Vrbica, Plášťovce and Čebovce. In Novohrad, it is the line south of Lučenec and Veľký Krtíš. There are ethnically mixed villages in these areas. Similarly, there are villages with Slovak settlements on Hungarian territory that have preserved cultural features and customs from Hont or Novohrad, examples are the Slovak settlements in the neighbourhood of Balážske Ďarmoty and Selešťany. As a result of migration, however, the population ratio is currently changing (Beňušková, 1998). Due to the national diversity of the population in the Poiplie region, regional awareness is low. Cultural overlaps occur and the society loses a sense of regional identity and belonging. The individual has difficulty defining his identity and belonging. It is therefore more than necessary to follow up on the existing cultural signs in the given location, define them correctly and interpret them in an adequate way, locally but also beyond the borders of the regions.
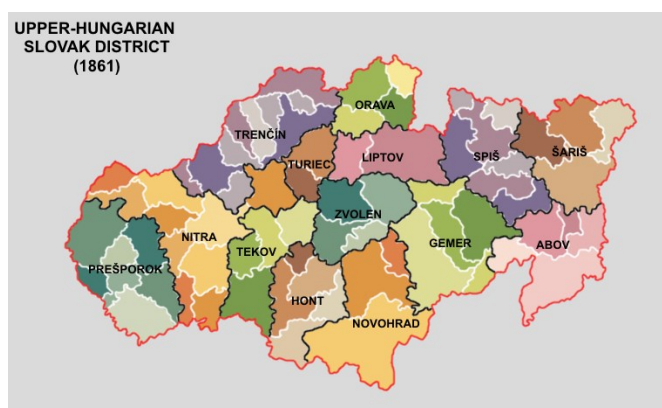

Fig. 5. Upper–Hungarian Slovak District 1861. (Source: AmateurSlovak-Historian, 2019)

In the past, Novohrad was one of the most developed regions of Hungary in what was then Slovakia. It is considered one of the oldest territorial-legal entities in Hungary. Its origin dates back to the turn of the 10th and 11th centuries when the territory of Hont also fell under its administration, which was subsequently separated in the 11th century (Beňušková, 1998). However, the cultures of these two areas are mutually influencing each other until the present time. The territory thus has an interesting history and a well-preserved traditional culture as well as natural wealth. Currently, the regions of Hont and Novohrad are among the less developed regions affected by poverty and a high level of unemployment. Considering the aforementioned regional specifics of the location in a proper way can help regions in the fight against high unemployment and support the development of ethno-, agro- and ecotourism.

THE ROLE OF DESIGN IN REGIONAL DEVELOPMENT

Regional development and its maintenance consist in systematic and creative creation which is often absent. This situation creates space for designers who, through extensive informative research, creative activity and modern technologies, can identify systematic steps oriented to maintaining culture. Therefore, it is necessary to incorporate design into the regionalisation process. Design plays a fundamental role in the creation of new products, services and systems. It is a way of solving problems and finding the best solutions aimed at a wide range of users. Design can positively influence the quality of public space and services, increase innovation in the region and respond to societal expectations. Design requires expertise and a support system to implement it. That is why it is so important to create a network of cooperation and exchange of information between entrepreneurs, designers, representatives of self-governing units and the academic community.

Case study 1

The initial phase of the research was inspired by the mentioned foreign projects with the focus on creating a space for the cooperation of craftsmen and local stakeholders in the framework of the design process. We prioritised creation, production from locally available materials and distribution of regional products in the studied region as well as beyond its borders, for the purpose of economic and cultural development. The partial goal was to design and create a product or a collection of products inspired by the local folk culture. In the academic sphere, there was an attempt to materialise this idea through the studio work of the fifth year of study at the Institute of Design (Faculty of Architecture, Slovak University of Technology, 2019), on the topic of the IDENTITY SK project, under the guidance of Michala Lipková. The project was implemented simultaneously with the "Follow the Root" project. The impetus for the creation of the project was the pedagogical mobility of the American designer with Slovak roots, John Zachary Yelnosky, who had then successfully completed his studies at the University of Rhode Island School of Design (RISD).

"The aim of the project, from teachers' side, was to experiment with the teaching methodology of the studio oriented to product design. The pedagogical intention was to expand students' expertise in research methodology focused on the area of design inspired by local crafts and material culture (according to Banika's terminology - the field of ethnodesign)." (Lipková, 2021) The resulting product of the project (OZI hanger) corresponds to the peasant tradition of the village of Želovce (Novohrad region). As for the material solution (the original material used for the production of the scythe - ash and maple wood) and morphology, the effort was to preserve the authenticity of the source of inspiration, i.e. the scythe (the simplicity of processing - the possibilities of the carpenters of the time), which was the most important tool of the farmer during the harvest season, as well as the identity in the three-legged construction, which represents mutual help and support of the farmers of the studied area.

Fig. 6. Coat hanger OZI. (Photo: Tomáš Páriš, 2019)

In order for the created products to represent a specific region, it is necessary to follow up on the design language of the area through a comprehensive survey of the local folk culture and thus, reflect it in their specific morphology and material composition. In order to capture the design language of the region and guide creation, it is therefore necessary to become familiar with locally available materials, technologies and craftsmen. Research in the field of crafts and their products is an integral part of the process. Depending on the needs of the local population and the availability of materials, various important crafts developed in the regions. However, many have disappeared to this day. A search in available databases and field research are necessary for the processing of current craft activities (in many cases, craft is a free-time activity of individual "garage craftsmen", their existence is therefore unknown without field research). Current existing trades in the regions: carving, carpentry, cooper, tailoring, whistle-making, wickerwork, lace-making, embroidery, Easter egg-making, honey-making, musical instrument-making, bag-making, glass-blowing.

In the course of research, it is also important to establish cooperation in professional circles, for instance in the field of social sciences, cultural studies, sociology, economics, etc. Interdisciplinary cooperation will significantly help in the domain of scientific activity and the value of the information obtained in the genesis of proposals. The subsequent step consists in the creation of locally sustainable relations based on cooperation that can be achieved by segmented production of products, which will involve the participation of several areas of the region. In the creation process, one of the goals is to establish a creative space with active regional cooperation and to determine a systematic creative process. Since not only the cooperation during the creation of design contributes to economic development, but it also leads to the unification of society and the restoration of cultural belonging. The research will serve as a guide to innovative ways of approaching regional development and at the same time will be a model for the surrounding regions. (Kotradyová, Borysko, Lipková, 2022)

The original research method was aimed at the creation of a product, which in its essence is the designer's subjective view of the local culture of the Hont and Novohrad regions, while the participation of the population in the creation process is limited to the form of processing materials and production. The result is the product of an individual who tries to implement design as an element of regional development, regardless of the needs of the local population. This approach turned out to be inappropriate. The project itself and its resulting semester work is successful and meets the assignment criteria but in the follow-up of the work, however, the author prefers the participation of the local population in the creation process as a direct source of regional knowledge, as part of the design in the regional cultural sphere. Design should not act as a foreign element dictating the direction of culture on the basis of customary process actions. Its task is to adapt to the researched environment and, using expert knowledge, to support living segments of culture that people identify with and consider as signs of their identity.

Case study 2

Due to the failure of the first research method, the following part of the article is devoted to a new research method, which consists in conducting field research of the area through interviews with the local population and establishing cooperation with cultural and artistic associations in the regions. Establishing a closer contact with the population is a key step in revealing the real and living cultural values of the region recognised by the wider public. It is essential to cooperate with educational centres that possess important information about cultural life and artistic creation in the region. Their expert-advisory, methodical and information-documentation activity will serve as an important source of information for the benefit of ongoing research. The organisation is also in intensive contact and cooperates with the towns and villages of the region in organising cultural events. The available network of established connections and contacts of the educational centre will serve as an ideal centre for site research. The cultural, educational and methodical institution HOS (Hontiansko-ipeľské osvetové stredisko) has been established for the Hont area. The centre is located in the district town of Veľký Krtíš, Slovakia. The Novohrad Education Centre with its headquarters in Lučenec operates in the Novohrad region (HOS, 2022).

The research team focused on the Hont educational centre because of existing contacts in the district. Moreover, the educational centre is located in the Veľký Krtíš district which is at the border of both regions. The location appears to be ideal in an effort to discover a cultural heritage that would fulfil the representative function of both regions. Following the consultation with the HOS director, Cyril Páriš, the research team acquired information about the existence of the Hont Workshop of traditional craft. Various educational courses take place in the workshop under the guidance of methodologist Katarína Hanková (she is in charge of folklore and traditional culture, film, education, research and digitisation at HOS) and her colleagues. By organising courses, they try to develop the aesthetic sense of the general public, develop skills and creative abilities in cooperation with craftsmen, and last but not least, they try to revive the local population's interest in cultural heritage. HOS organizes the following courses: "Let's sew robes", a course in lace, making

straw baskets, making and modifying costume parts, crocheting and knitting. In addition to courses, the workshop also offers space for repairing of traditional costumes.

Popular courses include the "Let's sew our robes" course and the lace-making course. The content of the course "Sewing robes" is the creation of products inspired by traditional folk clothing from the Hont region. There is also a visible effort to produce and distribute products with a regional character. These include bags, pouches and clothing components (shirts, skirts, etc.) with specific Hont and Novohrad patterns. The production process is simplified for course members due to time constraints and for the ease of technical teaching. For instance, during this course, participants learn how to make a traditional skirt: the Čelovský type of skirt is chosen, which represents the simplest cut. The creation process also requires an adequate replacement of materials (Fig. 7) due to the reduction of production costs (instead of real cashmere, an imitation with an identical pattern, colour and structure is used - the price of real cashmere is significantly more expensive). The course of beaded lace has a significant importance in the Hont Workshop of Traditional Crafts. Through the courses, this craft is spread and preserved among the population.

In the past, beaded lace was used in many areas of Slovakia. Individual regions as well as their villages were differentiated by a specific type of lace. They differed in the way of knitting, weave, material used, colour, etc. Lacemaking schools and workshops were also established in some areas (Hont, Banská Hodruša – from the end of the 19th century to the middle of the 20th century). According to the prevailing type of employment in the area, lace is divided into miner and peasant lace. Miner lace was produced in the northern part of Hont with a developed mining industry (Banská Hodruša, Banská Štiavnica, etc.) and some villages in the Veľký Krtíš and Lučenec districts. These were delicate white laces made of thin yarn, primarily intended for sale (Lešková, Mihálik, Miháliková, 2006). In the remaining parts of Hont and Novohrad with predominant agricultural activity, the production of peasant lace was developed. Peasant lace was intended for personal use or distribution to the surrounding area. Its structure was solid, intended for the working environment. It was made of thicker and stronger yarn (e.g. linen, hemp threads). At the beginning of the 20th century, its decoration was expanded to include a spectrum of coloured threads. Chopstick lace had a wide scope of use in the regions. It was used as a decoration for caps, parts of women's costumes (like skirts, shirts and even sheets, to name but a few) or in the production of tablecloths or bed sheets. The eventual modernisation of costumes, however, caused the gradual disappearance of lace.

The traditional Hont and Novohrad lace turned out to be a still living and largely well-preserved cultural heritage thanks to the activities of the HOS and individuals from the district. The greatest merit in maintaining this tradition belongs to Andrej Kmeť (1841-1908), a collector of lace and embroidery in Hont. The tradition of Hont lace is maintained mainly by organising courses. The courses are presented in a pleasant environment with a direct contact with the material and processing technology. After completing the basic course, many participants decide to continue with additional extension courses. Two pilot courses of Hont lace were held in 1995 under the auspices of the Regional Cultural Centre in Veľký Krtíš and subsequently, extension courses were organised (Lešková, Mihálik, Miháliková, 2006). The courses were led by experts, namely the following: Tatiana Uhrinová and Iveta Žlnková from Veľký Krtíš, Anna Matejkinová from Litava (masters traditional lace knitting without pattern), Juraj Zajonc and Oľga Pipíšová-Fratričová (experts in the demanding patterns of Hont and Novohrad lace).

Fig. 7. Materials for workshop "Let's sew our robes", Hontianska dielňa tradičného remesla (Hontian workshop of traditional craft). (Photo: Tomáš Páriš, 2022)

Another important event is the Čipka festival in Hont which has been organised every year since 2003: 2003 – Sucháň, 2004 – Lackov, 2005 – Senohrad, Litava, Lackov, Sucháň, 2006 – Cerovo, Príbelce, Lackov, Sucháň, Litava, 2022 – Sucháň. This is an exhibition of traditional peasant lace with a demonstration of lace making in the reserved premises of the village (Lešková, Triznová, 2012). An important role in documenting the traditional lace of Hont and Novohrad is currently held by Iveta Žlnková. She did not inherit the drumming technique but rather she acquired it by studying literature and taking courses in Slovakia and the Czech Republic. Her precise work could be seen at several exhibitions in Slovakia (Krakovany, Nová Dubnica, Trenčín, Veľký Krtíš, Žilina) and also abroad (Czech Republic, Belgium, Croatia) Her painted patterns are a rare documentation of regional beaded lace (Fig. 8). Thanks to the interweaving of historical preserved laces, many works of this tradition come to life anew.

The laces of Hont and Novohrad are a specific cultural heritage of the regions. They have built a solid background through organising festivals and workshops. However, social interest is declining. In order to preserve this tradition, it is necessary to bring it closer to the current generation. It requires a new user form that would be interesting even for the current generation. However, the tradition must be preserved so that it is recognisable and accepted by the public. Participatory design will therefore be a key aspect of creation. Participatory or cooperative design is a valuable tool in the field of design creation. Its role is to involve stakeholders – designers, researchers and end users – in the design process to ensure that the final product meets all the needs of the consumer. This new approach comes from Scandinavia and results from the fact that consumers were forced to adapt to the designers' and companies' ideas and principles that were not intuitive to them after purchasing a product. By using participatory design methods, we eliminate this undesirable phenomenon and create products that meet almost all of society's requirements. Therefore, it is essential in the next step to deepen the cooperation with HOS members and lace experts as well as active participants in courses with the intention of creating regional products.
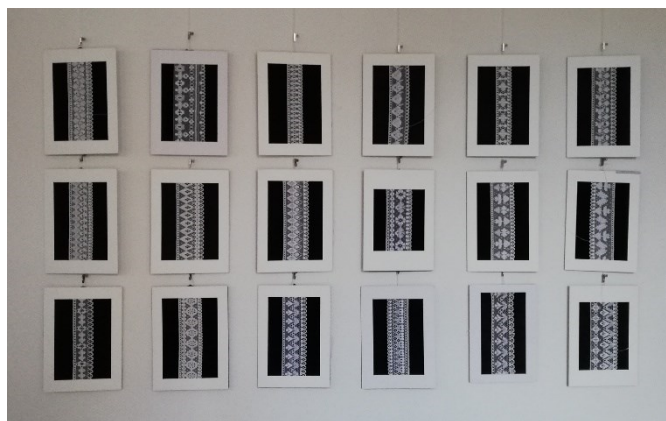
Fig. 8. A collection of beaded lace of Iveta Žlnková. (Photo: Tomáš Páriš, 2022)

CONCLUSION

Based on the aforementioned current state of Slovak folk culture, it is recommended to take necessary steps in pursuit of this cultural maintenance. The investigated regions of Hont and Novohrad require exceptional specific attention and support because of this low regional awareness by the local population. In this case, design becomes an ideal vehicle for cultural development of the region as well as a means of its economic support. It is thus essential to incorporate design into the regionalisation process. Regions have a unique cultural identity and a specific character of material culture which must be followed up and supported by establishing practical and systematic creation processes. It is essential to draw inspiration from existing projects (Werkraum Bregenzerwald, Design Silesia, and Sploty na fali). However, it is necessary to transform the existing creative procedures in a suitable and relevant way for the given location, then apply these strategies and verify their functionality. Ultimately, because these procedures may have a different functionality in other countries, they may not work effectively in Slovak regions. Eventually, a successful outcome is influenced by natural, socio-cultural, geopolitical, historical and other phenomenological factors that have shaped the area over time.

Nevertheless, the authors consider that the establishment of a cooperative enterprise with the local government, local population, activists and cultural associations is the most crucial factor of the creation process, with the intention of identifying living cultural elements that have strong roots in the identity of the locality and the potential for further development. Similarly, on the basis of cooperation with the local cultural centre HOS and interested parties, it was possible to reveal one of the living cultural heritages which is significant for the Hont and Novohrad region – the traditional lace of Hont and Novohrad. The expected goal of the research and future workshops is the collective design of representative products that are intended for the current market in terms of raising awareness and preserving the investigated signature of this regional identity. By collaborating in the design process, we can thus support and revive certain existing elements of folk culture into a contemporary, sustainable form through products with the attributes of local identity that would be acceptable to the local society.

Acknowledgements

References

AmateurSlovakHistorian (2019) "Map Slovakia comitates 1918.png", Wikipedia. [online] Available at: https://sk.wikipedia.org/wiki/S%C3%BAbor:Map_Slovakia_comitates_1918.png

Bašovský, O., Lauko, V. (1990) "Úvod do regionálnej geografie" (Introduction to regional geography). SPN, Bratislava, Slovakia, ISBN 8008002786 (in Slovak)

Beňušková, Z. (1998) "Tradičná kultúra regiónov Slovenska – Prehľad charakteristických znakov" (Traditional culture of the regions of Slovakia - Overview of characteristic features), Veda, Slovak Academy of Sciences, Bratislava, Slovakia, ISBN 80-224-0518-3 (in Slovak)

BCDlab (2017) "Projekt APVV 16-0567". [online] Available at: http://www.bcdlab.eu/APVV-16-0567.html [Accessed: 21 Sep 2022] (in Slovak)

Bohunický, M. (2018) "Dostala novú tvár. Jakub Liška vrátil modranskú keramiku medzi masy" (She got a new face. Jakub Liška returned Modran ceramics to the masses), Forbes. [online] Available at: https://www.forbes.sk/dostala-novu-tvar-jakub-liska-vratil-modransku-keramiku-medzi-masy/ [Accessed: 29 Sep 2022] (in Slovak)

Brloš, J. (2009) "Hont bez hraníc" (Hont without borders), Obec Hrušov, Hrušov, Slovakia. ISBN 978-80-969748-7-0 (in Slovak)

Grosse, J. (2019) "Werkraum Bregenzerwald", Vorarlberg.travel. [online] Available at: https://www.vorarlberg.travel/werkraum-bregenzerwald/ [Accessed: 1 Oct 2022] (in German)

HOS (2022) "O nás". [online] Available at: http://www.h-ios.sk/o-nas/ [Accessed: 28 Sep 2022] (in Slovak)

Kóňa, O. (2020) "modranska: Sme z Modry a mrzelo nás, že sa tu končí stáročná hrnčiarska tradícia", Sóda, Slovakia. [online] Available at: https://soda.o2.sk/biznis-cat/modranska-sme-z-modry-a-mrzelo-nas-ze-sa-tu-konci-starocna-hrnciarska-tradicia/ (in Slovak)

Kotradyová, V., Borysko, W., Lipková, M., Daniel, P. (2018) "Common Platform of Design, Architecture and Social Science", In: Kotradyová, V., Kočlík, D., Kučerová, M. (eds.) Identita SK, SPEKTRUM STU, Bratislava, Slovakia, p. 9

Kotradyová, V., Borysko, W., Lipková, M. (2022) "IDENTITA SK - Interpretácia, adaptácia a transformácia ľudovej/regionálnej materiálnej kultúry"(IDENTITA SK - Interpretation, adaptation and transformation of folk/regional material culture), Spektrum STU, Bratislava, Slovakia (scientific monograph in preparation for printing) (in Slovak)

Lešková, I., Mihálik, J., Miháliková, M. (2006) "Čipka v Honte – tichá krása rozkvitla" (Lace in Hont - quiet beauty blossomed), Mikroregion Východný Hont, Sucháň, Slovakia. ISBN 80-969573-1-7 (in Slovak)

Lešková, I., Triznová, A. (2012) "Čipka v Honte – tichá krása rozkvitla II" (Lace in Hont - quiet beauty blossomed), Mikroregion Východný Hont, Sucháň, Slovakia. ISBN: 978-80971075-8-1 (in Slovak)

Lipková, M. (2021) "Prototypovanie zmeny", Habilitation thesis, FAD STU, Bratislava, Slovakia

Samorząd Województwa Śląskiego, "Design Silesia". [online] Available at: https://www.slaskie.pl/content/design-silesia- [Accessed: 20 Sep 2022] (in Polish)

SAShE (2018) "Kruhy na vode: Zapojte sa do súťaže dizajnu orientovaného na remeslo"(Circles on water: Enter the craft-oriented design competition). [online] Available at: https://www.sashe.sk/SAShE.sk/journal/pozvanka-sutaz-dizajnu-kruhy-na-vode [Accessed: 29 Sep 2022] (in Slovak)

ÚĽUV (The Centre for Folk Art Production) (2022). [online] Available at: http://www.uluv.sk/en/web/home/ [Accessed: 27 Sep 2022]

ÚĽUV (2016) "vysledky-sutaze"(competition results). [online] Available at: http://www.uluv.sk/domain/flox/files/kruhy-na-vode/2016/vysledky-sutaze.pdf

Zamek Cieszyn (2017) "Sploty na fali". [online] Available at: https://www.zamekcieszyn.pl/pl/artykul/sploty-na-fali-1017 [Accessed: 20 Sep 2022] (in Polish)

Summaries

Ramsha Nazir Malik, Zhang Haiao

Martin Uhrík, Alexander Kupko, Michaela Krpalová, Roman Hajtmanek

Michala Lipková, Zuzana Pergerová, Zuzana Turlíková

Tomáš Páriš, Veronika Kotradyová

SAIDPUR VILLAGE THROUGH ARCHITECTURAL LENS: DECIPHERING URBAN PATTERN AND ARCHITECTURAL HERITAGE

Ramsha Nazir Malik, Zhang Haiao

This research is based on the case study of Saidpur village, one of the oldest villages in Pakistan and the old subcontinent. Saidpur village has a scenic landscape and centuries-old historic importance. From the Mughal dynasty to subcontinent partitioning, this village has witnessed evolution of diverse eras. As people started to inhabit Saidpur, they brought culture, arts, folklore, architecture, traditions, customs, and their beliefs with them. The place first known only for being a garden resort with streams, mountains, gardens, and cattle farming, also became famous for temples and religious centres, folklore, and pottery work. Vernacular local materials from nearby areas such as stone and lime were mainly used to build constructions in the area. Brick was also used but was rare and more expensive than the local materials. The Saidpur village's architectural art and heritage embraces three cultures; Sikhism, Hinduism, and Islam, concentrated on one node in this place. Saidpur currently has a total population of 8,437 where 58% of the population are permanent residents who have inherited this place from their ancestors. Emphasis of this study was on the urban pattern and growth of the village through past historic eras. It further analysed individual architectural case studies of each heritage building present on site. Since there were no proper or substantial records, data, drawings, maps, or any other information found on Saidpur, it was important to generate a study that would focus on Saidpur's urban spread, history, architectural heritage, current situation, and future scope. This study has dissected and analysed the context, history, culture, vernacular construction materials and style, heritage, urban spread, and architectural elements of Saidpur. The Saidpur village has a formation of an urban pattern that started from a concentrated node at the centre of the village in 1500s. A Hindu temple was built that gave it a prestigious status of a pilgrim centre. This was further followed by building a Sikh temple with a Dharamsala, and a Mosque. In Saidpur, one used to hear the prayer calls from the Mosque, and bells and melodies from the Hindu and Sikh temples at the same time. With these religious and cultural centres, civilization in Saidpur also grew and has reached its maximum limits today. From a clutter of a few houses, Saidpur grew into a packed, walled to walled, and cluster-phobic village. Saidpur's streets started to resemble other streets of old historic cities of the subcontinent such as inner (androon) Rawalpindi. This research has investigated and analysed this evolution and urban growth and presented a case study on the old and current urban and architectural characteristics of Saidpur village. It has presented a study of Saidpur's population spread, timeline of construction and building spread, characteristics and ambiance of streets, as well as architectural features and elements and their transformation over the time, and construction styles or materials including their evolution. The centre of Saidpur serves as a main node in which all the temples and heritage buildings lie. This

serves as the main hub and focal point of Saidpur today. This aspect of Saidpur where multi architectural and cultural heritage exists in one node, is unique and has gained Saidpur popularity. It is also a main focus of tourist attraction today, displaying the art of the past. In one perspective, one could see old domes and minarets emerging from the Mosque and temples lying here. This node mainly includes the heritage Hindu temple, Sikh temple with Dharamsala, mosque, an old gate to access the temples and Haveli. For some of the heritage buildings, even courtyards or landscapes are shared, yet people used to make their offerings peacefully in their respective temples. Our research has analysed this node of Saidpur and focused on analysing Saidpur's heritage buildings in detail. It has presented a case on its historic architectural features that are decaying on site. The old and current construction methods and styles of the village were analysed and discussed. Heritage buildings on site were documented, analysed, sketched, and reviewed in detail to generate and preserve its historical background, architectural details, and construction style. This study has evaluated and recorded all the architectural information related to the heritage buildings on site to formulate records on the old and present Saidpur. In addition, the case presented on the current condition of decaying heritage on site intends to create awareness on the necessitated protection and promotion of this ancient village. This study included multiple site visits, where data was collected through onsite observations. By visiting each building in Saidpur, data like demography, heritage buildings' analysis, Saidpur's architectural timeline, urban crawl, and pattern of the village was collected, studied, and analysed. The process also involved various interviews and surveys to collect authentic information on Saidpur. This research aims to bring a detailed case study on the account of Saidpur's urban and architectural heritage and hopes for global recognition and heritage preservation activities for the village.

AUGMENTED REALITY AND TANGIBLE USER INTERFACES AS AN EXTENSION OF COMPUTATIONAL DESIGN TOOLS

Martin Uhrík, Alexander Kupko, Michaela Krpalová, Roman Hajtmanek

Keywords: mixed reality, tangible landscape, augmented reality, virtual reality, computational design, modularity

The paper envisions the use of Augmented Reality (AR) as an interactive and communication tool used in architectural design research, education, and practice. It summarises the current information and various applications of this immersive technology in both the theoretical and practical field and focuses on a specific type of AR implementation – Tangible User Interface (TUI) in the computational design context. In 2022, Philipp A. Rauschnabel's research pointed out the ongoing confusion in the terminology. In his most recent paper on the topic of Mixed Realities, theoretical definitions are confronted with current industry practices. Rauschnabel acknowledges the ideas of Milgram and Kishino, resp. Schnabel and Seichter, along with various other viewpoints, labels their approach as "MR-centred view" and brings up its potential problems. He argues that AR and VR have opposing designer goals and user experiences, therefore cannot be united under one term. In his article, he introduces the term xRealities (XR) as an umbrella term for AR and VR. Despite the long history behind the idea of XR, the concept itself was not feasible until recently, mainly because of the unavailability of underlying technologies, including necessary processing power and sensors and because of the high cost of licensing of existing toolsets. Widespread adoption of handheld mobile devices such as smartphones and tablets possessing some of the necessary features including orientation sensors, high-quality cameras and microphones and location-based technologies has led to increased availability and affordability of XR-based tools. The article explores existing AR and VR technologies and toolkits with varying degrees of availability, affordability and skillsets needed for their usage. It covers multiple types of AR and VR technologies, including tracker-based optical AR using ArUco or QR markers, usage of a multitude of sensors in current smartphones and tablets and MR devices such as Microsoft HoloLens. Several degrees of interaction between physical and virtual environment using the aforementioned tools are presented. The authors explore possibilities and ways of encouraging students and the public to use and create their own AR experiences using freely available tools. Multiple libraries, SDKs and tools are available with a varying degree of

usability, adoption, availability, and cost. Currently, multiple tools for creating XR experiences with varying degrees of creative freedom and learning curves are freely available. Multiple toolkits, such as Vuforia, AR Toolkit, or various software development kits (SDKs), including those of Oculus Rift or HoloLens, enable the highest level of modification and integration, with the main drawback being the need for highly advanced programming skills. A recently popular and widely used special type of tool combining AR and TUI in the collaborative modelling is tangible landscape. Tangible landscape allows users to model the scaled landscape by hand physically, 3D-scan it and virtualise it in a computer. The virtualised model can be used for various analyses or computation, which may be processed and then visualised back on the physical model, giving the users instant feedback. The tool is mainly used for landscape and geospatial modelling, and it is assembled with a mass for physical modelling – mainly kinetic sand, a projector, 3D scanner and a computer. The research in this article explores the possibilities of extending the utilisation of the tangible landscape beyond the large-scale planning into the architectural and urban planning domain. The use of different, more suitable software for architectural profession was a key factor in the adaptation of the tool for architectural use, as the originally-used GRASS GIS software was developed mainly for large scale geo-modelling. From the wide range of architectural software tools, the program Rhinoceros with plugin Grasshopper was chosen, as it is widely used by architects, and it is capable of the algorithmic modelling. The setup of the first constructed prototype of Tangible Landscape at the Faculty of Architecture and Design of the Slovak University of Technology in Bratislava, Slovakia, uses a projector, which allows simplification of the stand holding it and a 3D scanner, mounted directly on the projector in contrast to the tool's predecessors from around the world. The use of the prototype has already shown that it improves communication during the collaboration as it blends the physical 3D and digital layers. The design is thus more legible and design decisions are more intuitive. Another aspect of the tool is its educational potential. Interactive engaging of the touch and visual senses has led to better understanding and remembering of the concept. Making the computational tools more accessible and intuitive for everyone is a way to use different approaches to design more widely. The plan for follow-up research is to pursue its utilisation in modular and discrete architectural projects using components and designing from inside out, with possible implementation of Monoceros tool.

REDEFINING THE LEARNING EXPERIENCE WITHIN THE DESIGN EDUCATION AT SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA

Michala Lipková, Zuzana Pergerová, Zuzana Turlíková

Keywords: design education, project-based learning, soft skills, design graduates, creative thinking, interdisciplinarity, learning experience design, teamwork, product design, vertical studio

Digital and communication technologies have accelerated the flow of information and its transition to knowledge. Interaction, speed and open-source platforms that emerged with the rise of the internet, access to vast scientific data resources, or even peer learning force the world to re-evaluate and redefine not only the old conservative model of institutional education but also the meaning of fundamental terms like "education" and "knowledge" as such. Formal education in the field of design and information technologies, due to the rapid development in the practice of these disciplines, is certainly one in which traditional research practices combined with the length of standard funding and publication cycles cause knowledge delays and its rapid obsolescence. Traditionally, art and design education has inherited a strong focus on individual work and manual craftsmanship. Industrial design as a discipline has been focused on physical products ever since. The complexity of societal and scientific problems requires a change in this approach. The need for both inter-personal and intra-personal qualities – soft skills – has emerged. Furthermore, interdisciplinary and transdisciplinary cooperation has been called for by the business sector and policy-makers. The importance of soft skills is increasing both globally and in design education. The Future of Jobs Report 2020 released by the World Economic Forum indicates that half of today's working population will be required to re-skill in a five years' time. The COVID-19 pandemic has brought double disruption of the economic impacts and

the ongoing demand for automation. The paper aims to present the specific data gathered in an extensive survey on the future of design education investigating the key skills, knowledge and abilities of design students and recent graduates. The survey was conducted among alumni of the Institute of Design at the Faculty of Architecture and Design at the Slovak University of Technology (FAD STU) in Bratislava, current students, followed by deep interviews with the teaching staff, company representatives and HR managers. The results indicate a deficit in the soft skills in design education. As much as 45% of the alumni stated that their perseverance and self-motivation was insufficient, whereas 36% of them lacked both development of critical thinking and creativity. Only 21% declared the ability of effective cooperation in teams. The second survey, conducted among students in the design study programme (full-time) at FAD STU in 2019, led to similar outcomes. Students asked for more extracurricular workshops, competitions and internships. On the other hand, they self-reflexively declared that they are weak in time management and therefore are rarely able to participate in design contests. They named the need to focus on improving presentation skills, encouraging foreign language interaction, developing design thinking and including more lectures about design philosophy to support argumentation about the meaning and purpose of creative concepts and the impact of design in society. Students also suggested focusing on practising professional communication in order to advocate for their creative concepts and learning how to make quick decisions in a dynamic world, followed by more opportunities to experience teamwork. The data regarding the future of design education and the inevitable need to support soft skills cultivation not only in the Slovak labour market have been complemented with the statistics of Profesia.sk, the biggest job portal in Slovakia with overlaps to V4, as it expanded to Hungary (2006) and the Czech Republic (2007). Despite the fact that the position of a "designer" is still mainly hard-skill oriented, the advertised positions increasingly demand good communication skills, independence and responsibility, as well as analytical or logical thinking or resistance to stress from applicants. This could be due to the fact that product or interior designers in Slovakia mostly start their own business and tend to work alone or in small teams, without the need to hire staff, while the majority of positions at Profesia.sk is advertised mostly by small and medium enterprises that can afford to hire drawers of technical documentation, 3D modellers, web designers or often DTP or graphic designers. The third survey was conducted in May 2020 and targeted university teaching staff in design study programmes in the V4 countries. The survey, among other questions, investigated the essential, key knowledge and capabilities of a well-prepared and competent design graduate of the future. The outcomes have fostered identification of an essential soft skill set for a young design graduate who is about to enter the labour market. The natural need to develop creativity, critical thinking, complex problem-solving and active learning in contemporary design education requires new approaches to the learning process. Through the introduction of three new approaches to design education, represented by the nonlinear learning, the student as a critical agent and new roles of the design tutor, a selection of emerging educational strategies will be described and compared. The follow-up strategies resonate in contemporary discourse and reflect the cultivation of skills, confirmed as lacking in the curriculum by the surveys.

POTENTIAL CONTRIBUTION OF DESIGN IN STRENGTHENING OF REGIONAL IDENTITY IN SOUTHERN SLOVAKIA

Tomáš Páriš, Veronika Kotradyová

Keywords: region, cultural identity, traditional and folk crafts, Slovak regional design

The article deals with the phenomenon of the region's cultural identity loss and efforts to save it through design. Region is a geographically separated area of the state which has been shaped into its current form by various geological, geopolitical and socio-cultural factors. As a result of these influences, a unique regional culture with a specific tangible and intangible heritage was created. The country thus has a unique cultural identity that defines the character of its material culture. Nowadays, we are witnessing the gradual loss of cultural identity. It is an undesirable but common reality in many regions of Slovakia. The researched Hont and Novohrad regions are no exception. However, Slovakia has a great cultural wealth that deserves recognition and celebration. Considering the geographical location of Slovakia, there could arguably

more easily emerge colourful and internally diversified cultural regions. However, the identity of the tangible and intangible cultures of Central Europe is not clear-cut and thus, in many cases the identities are largely polarised. Due to the cultural diversity of the investigated regions, regional awareness is low. Cultural overlaps occur and the society loses a sense of regional identity and belonging. Furthermore, today's society is advancing too fast across new technologies, generating new habits. The authenticity of the original culture is thus suppressed at the expense of current development. The overall process of extinction is also accelerated by the current way of life, inappropriate approach, absence of creative processes and low initiative from the society's side. Regional development and its maintenance consist in systematic and creative creation which is often absent. This situation creates space for designers who, through extensive informative research, creative activity and modern technologies, can identify systematic steps oriented to maintaining culture. Therefore, it is necessary to incorporate design into the regionalisation process. Design plays a fundamental role in the creation of new products, services and systems. It is a way of solving problems and finding the best solutions aimed at a wide range of users. Design can positively influence the quality of public space and services, increase innovation in the region and respond to societal expectations. An ideal example of the positive influence of design and creative activity in favour of regional development is the globally recognized association Werkraum Bregenzerwald. It is an association made up of several members representing various trades and crafts. The primary mandate of the association is to support the economic and cultural development of the region. This organisation strives for the sustainable development of crafts and trade through the preservation of and creation of new jobs, local production of sustainable products and their subsequent distribution, the preservation of quality crafts and the creation of intimate relationships through cooperation between craftsmen and designers. Similar foreign projects include The Polish platform Design Silensia and The Sploty na fali project. Ways of maintaining traditions in Slovakia is mainly through the Centre for Folk Art Production (ÚĽUV). In the initial phase of the research, we prioritised creation, production from locally available materials and distribution of regional products in the studied region as well as beyond its borders, for the purpose of economic and cultural development. The partial goal was to design and create a product or a collection of products inspired by the local folk culture. However, this approach turned out to be inappropriate considering the fact that creation of a product is in the hands of a designer, while the participation of the population in the creation process is limited to the form of processing materials and production. This result is the product of an individual who tries to implement design as an element of regional development, regardless of the needs of the local population. Due to the failure of the first research method, the final part of the article is devoted to a new research method which focuses on participatory design. Participatory or cooperative design is a valuable tool in the field of design creation. Its role is to involve local cultural associations, stakeholders, designers, researchers and end users in the design process to ensure that the final product meets all the needs of the consumer. The new research method will focus on laces of Hont and Novohrad that represent a specific cultural heritage of the regions. In order to preserve this tradition, it is necessary to bring it closer to the current generation. However, the tradition must be preserved so that it is recognisable and accepted by the public. Therefore, it is essential to deepen the cooperation with locals and experts in the domain of the local traditional lace, as well as with active participants in courses with the intention of creating regional products. By collaborating in the design process, we can thus support and revive this existing element of folk culture into a contemporary, sustainable form through products with the attributes of local identity that would be acceptable to the local society.

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