

Architecture for recovery

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ABSTRACT: The reconstruction of Ukraine will be a challenge not only for politicians, but also for architects and urban planners. In the article, the authors address the question of what the renewal of Ukraine should look like? They posit that the current predicament should be understood as an opportunity to renew the building stock in a more qualitative, sustainable and inclusive way, so that the spatial framework for individual and community life can significantly improve. The article deals with the student design studio of an architectural faculty, where the topic of architecture for recovery was the semester assignment. The hypothesis is that the emphasis placed on flexibility, expandability, modularity, repeatability of the solution, speed of construction, availability of resources, efficiency and autonomy of operation, long life and quality of the internal environment will lead to sustainable solutions with high architectural quality for the recovery of destroyed settlements.

INTRODUCTION

Disasters, both natural (flood, earthquake) or man-made (war), have a devastating effect on the affected people and their environment, so it is necessary to reconstruct destroyed or damaged settlements regardless of the cause. It is necessary not only to ensure safety, provide shelter and communication (temporary shelters - ephemeral architecture, mobile equipment and connection), but also to help in the overall recovery process and return to normal life. This recovery has certain specificities; it is gradual, and it responds to changing priorities and available resources. At the same time, it should offer high quality without unnecessary compromises. In this study, the hypothesis is that the emphasis placed on flexibility, expandability, modularity, repeatability, construction speed, resource availability, efficiency and autonomy of operation, longevity and quality of the internal environment will lead to sustainable solutions and high architectural quality for the restoration of destroyed settlements and regions.

As part of teaching in the student design studios in the Faculty of Architecture and Design at Slovak University of Technology in Bratislava (STU), Slovakia, this hypothesis is verified. The renewal of Ukraine was chosen as an assignment in the Green Architecture Studio, and the results of the students' work are analysed as part of the research presented in this article. Flexible and expandable buildings for different types of facilities and different types of housing are the theme of students' designs. The use of recycled and natural materials, the application of the 3L concept (low energy, long life, loose fit - Alan Gordon's concept referred to another study [1]), multifunctional or adaptable use, construction efficiency and the greatest possible autonomy in operation are assumed. It should not be a temporary emergency solution, but a high-quality and long-life sustainable architecture, ready to respond to changing needs or climate changes. The war-damaged Ukraine has been selected, the restoration of which will be an important topic in the coming years. The goal is to find a general concept that can be reused and adapted to different conditions and sites. The authors believe that the knowledge from this study can be generalised and applied.

SHELTER AFTER A DISASTER, RECOVERY AFTER A DISASTER

Most disaster response strategies focus on the first days after a disaster. Saving lives is a priority here, ensuring drinking water, food, the most necessary health care, and at least temporary shelter is paramount. There is not much space left for architecture, but if there are a few days for better planning at that time, carefully prepared solutions can be applied instead of improvisations. The ephemeral architecture of such shelters is not self-serving, it brings disaster victims a better quality of life. There are six options for transitional settlement of displaced peoples: host families, rural or urban self-settlement, collective centres with mass shelter and self-settled or planned camps [2].

For all shelters that go beyond improvisation, the Better Shelter organisation [3] associated with the IKEA brand is worth mentioning. They offer not only housing (safe and dignified shelter for conflicts, disasters and homelessness),

but also modular health care facilities, classrooms and libraries for continuation of educational activities, and protection (private and safe spaces for community) [3]. This multifunctional approach has to be used also later in the reconstruction of the destroyed areas.

Transitional shelters are specific in the sense that they can be used as temporary shelters after a disaster, but later they can be upgraded into part of a permanent house, reused for another purpose, relocated from a temporary site to a permanent location, sold to generate income to aid with recovery or recycled for reconstruction [4].

This approach is interesting from the point of view of resource saving, because some time after the disaster - recovery starts. Recovery of society, economy and even settlements. The goal is no longer just to save lives, it is necessary to try to restore the quality of life to the level before the disaster or ideally even better. What does this mean in terms of settlement reconstruction? People need to live, but not in substandard quality apartments, not in temporary shelters. While for the first days after a disaster, ephemeral architecture is ideal; for *final* restoration, on the contrary, it is best to opt for timeless solutions appropriate to the needs of the affected people and capabilities of the society. As said by Valentyna Shulimborska from Ro3kvit (Rozkvit) - Urban Coalition for Ukraine at the New European Bauhaus Conference in Bratislava in April 2024:

It is necessary to accept the challenge. It is possible not only to restore but move forward.

It is necessary to ensure quality housing, but in addition to this, amenities are also necessary - shops, services and administration. Schools and kindergartens are needed too, as well as spaces for healthcare (perhaps including above-standard psychiatric care) and, finally, spaces for the renewal of the local community, for neighbours meeting and informal activities [5].

Society changes after a disaster, not only in the moment it happens (or duration - military conflicts can be quite long), but also years after it. Those social changes can be positive (co-operation in communities, solidarity) or negative (indifference, crime). The renewal of settlements and their building stock should respond to these changes, support the positive changes and prevent the negative ones. But long-term temporary solutions require double the costs and the need for resources - they should be avoided if possible. Thus, recovery (after the provision of elementary needs) should lead to long-term sustainable solutions.

CONSTRAINTS, CHALLENGES AND OPPORTUNITIES - THE RECOVERY OF UKRAINE

How to react to the lack of resources and means, how to face gradually changing needs, how to react to *green* requirements, how to make the best use of available resources and potential assistance from abroad? These are the questions to which answers are sought in general and also in architecture, for various types of disasters, and especially for the consequences of the war in Ukraine. The authors chose Ukraine as a design topic because it is a country close to Slovakia, with a similar culture and with climatic conditions that are familiar to local students.

What problems will be faced and what opportunities will appear in the restoration of settlements in Ukraine? Answers to these questions are sought in co-operation with students. The first step here is the formulation of the assignment, which must be based on certain assumptions. These were chosen on the base of resource study, experience of colleagues, information from Ukrainian partners from various projects (ESINERGY, New European Bauhaus) and from Ukrainian students. In the design studio, students began their work with informal brainstorming (Figure 1 - Figure 3 next page), and as part of that conducted a SWAT analysis to formulate the main points of the chosen topic, which were used to refine the design assignment.

It is believed that the main limitation will be the lack of financial resources in the devastated country, as even the massive aid from the US and Western countries cannot cover all the needs. Solutions for the renewal of settlements have, therefore, to be financially undemanding. But the old cliché that *we are not rich enough to buy cheap things* is also applicable in this situation. The challenge here is to find solutions that are affordable and economically optimal within the entire life cycle of buildings.

Another limitation will be the lack of material resources, the disrupted construction industry will not have enough capacity for large-scale reconstruction. This is an incentive for new solutions, for more extensive use of natural materials and recycling of construction waste. *Scavenging* ruins should become a source of raw materials. The destroyed infrastructure is also a limitation, the response to the need to restore energy supply should be based on more extensive use of local renewable energy sources and their sharing within communities, building modern smart grids and reducing the need for energy to operate buildings.

One can also assume limited human resources, here the modular construction with a high degree of prefabrication is the suitable solution. With this approach, a higher use of direct material aid from abroad is also possible. Social problems of various kinds must also be considered, a possible solution is to support the renewal of neighbourhoods and communities through architectural solutions, inclusive architecture (design for all [6]) and completion of the necessary health care infrastructure.

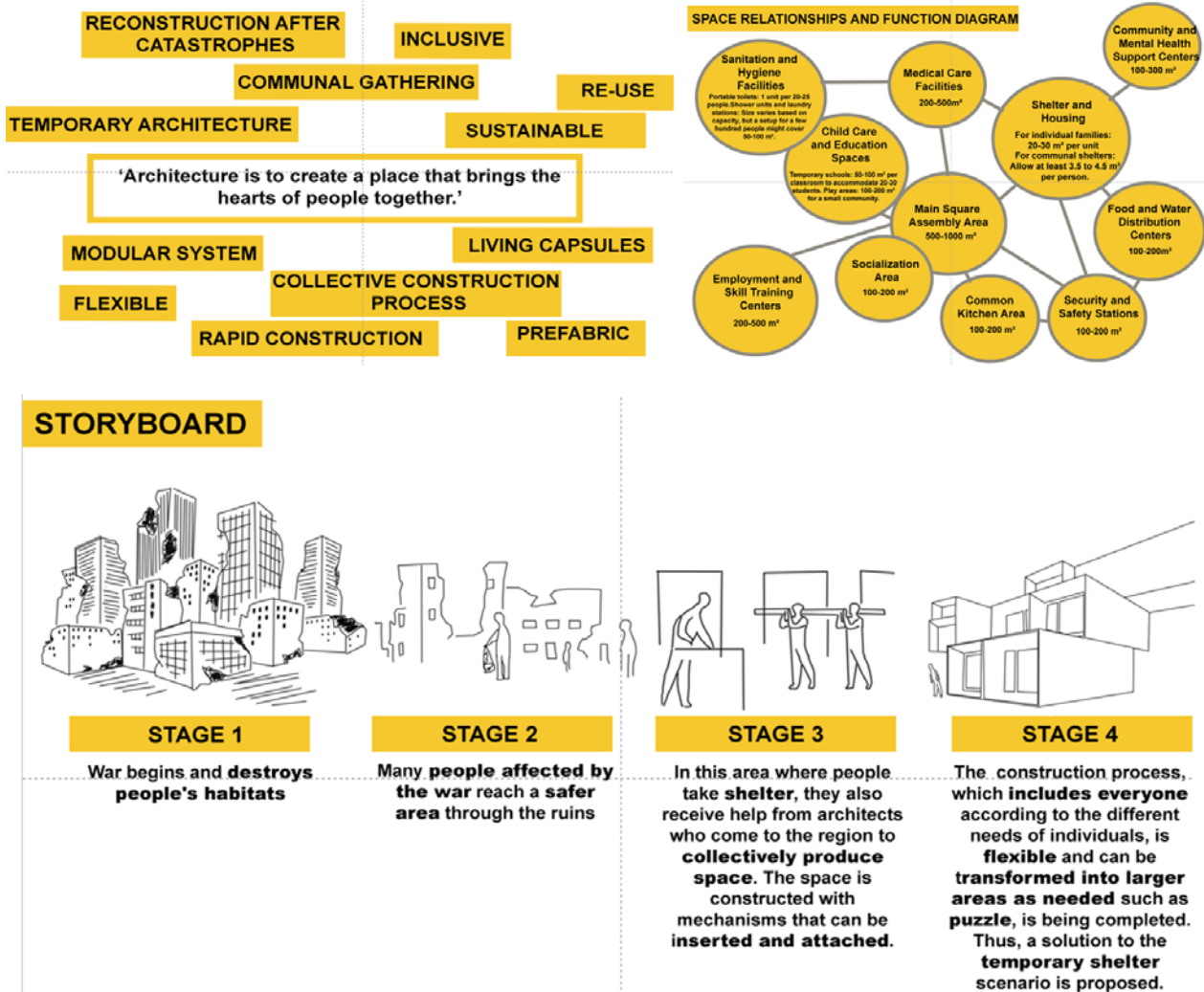


Figure 1, 2, 3: Brainstorming and a storyboard of the project (student B. Bahar Saatci).

These are some of the constraints and challenges that Ukraine will face in rebuilding. However, the renewal of Ukraine also offers new opportunities. One of them is the transformation of the building stock. The usual pace of replacement of outdated buildings with new ones is 1-2% per year. This will increase by an order of magnitude due to the destruction caused by the war. With a sensible approach, new buildings can be built according to the current and prepared European standards: with nearly zero energy consumption, with extensive use of renewable energy sources and with very small carbon footprint throughout their life cycle. Even for the restoration of partially destroyed buildings, a more radical method of reconstruction can be chosen than is possible with their uninterrupted operation.

For this particular *architecture for recovery*, Alex Gordon's concept of 3Ls seems to be very inspiring, even half a century after its introduction. Emphasis is on the adaptability (loose fit, long life) [1], while nearly zero energy needs (low energy) are standard today specify. Maybe a fourth *L* - low carbon - should be added today, promoting the use of natural building materials, and a fifth one, life-cycle optimisation, which is connected to recycling, reconstruction and modularity.

VISION OF EUROPEAN AID

In October 2022, The Conference on Architecture and Building Culture Policies (ECAP 2022) formulated the Prague Charter, which provides 10 recommendations for the post-war urban renewal of Ukraine [7]. It is declared that all actions of the foreign organisations must be in line with strategic development objectives set by the Ukrainian urban planning authorities. Adequate effort needs to be provided to strengthen capacities at regional and local level.

The Charter calls for people- and community-centred planning and design, connecting planning and urban design with sustainable economic and social development and the climate agenda, as well as long term planning, even in emergency situations. Housing provision is one of the key tasks in the post-war reconstruction efforts. The focus should be on creating mixed-use, energy-efficient, high density walkable neighbourhoods with high quality urban design integrating new housing into the local context. In the introduction to the Charter, urban planner Petr Návrat writes:

A well-designed policy framework is a prerequisite for a just and sustainable reconstruction of Ukraine. The aim shall be to create liveable neighbourhoods with opportunities for social and economic development of all groups of society, in other words, to build places that will make people happy [7].

Kees Christiaanse explains in the final part of the Prague Charter the German model of the International Building Exhibition (IBA) and proposes key topics for IBA Ukraine as an umbrella organisation for various post-war reconstruction efforts [8]. Kees Christiaanse's personal visit to the Faculty of Architecture and Design of the STU in Bratislava in January 2024 and his presentation of IBA Ukraine activities was one of the starting impulses for the assignment of the theme *architecture for recovery* in the design studio (Figure 4-Figure 17).

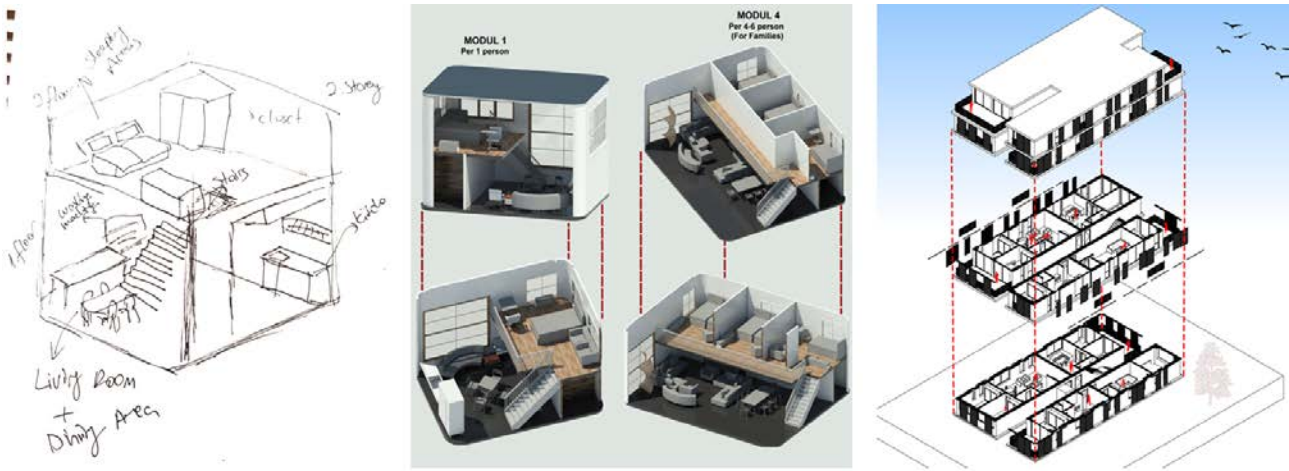


Figure 4, 5: Family house - first sketch of the project and final visualisation (l-c) (student B. Bahar Saatci).
 Figure 6: Modular apartment house - final scheme (r) (student G. Buachidze).

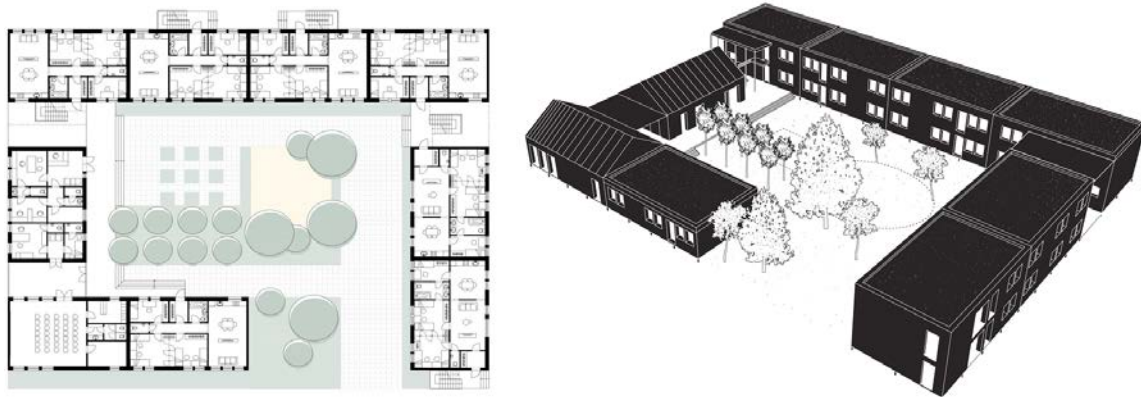


Figure 7, 8: Modular community housing - situation and axonometry (l-r) (student S. Jasiková).

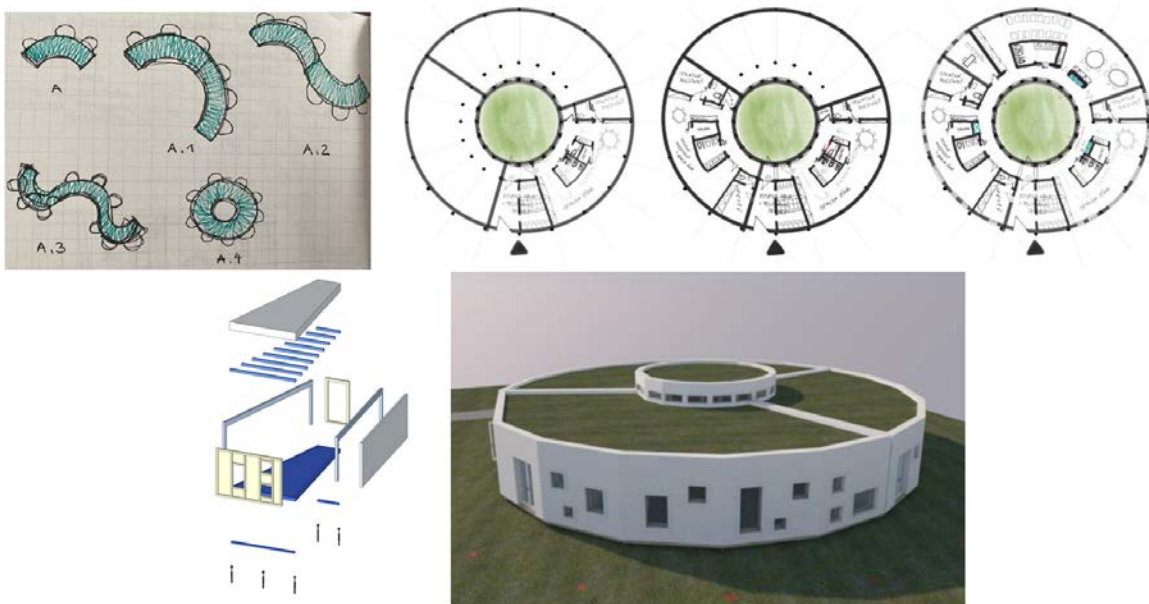


Figure 9, 10: Modular growing kindergarten - a sketch of modularity and three stages of growth (upper l-r) (student V. Babciová).
 Figure 11, 12: Modular growing kindergarten - a construction system and axonometry (lower l-r) (student V. Babciová).

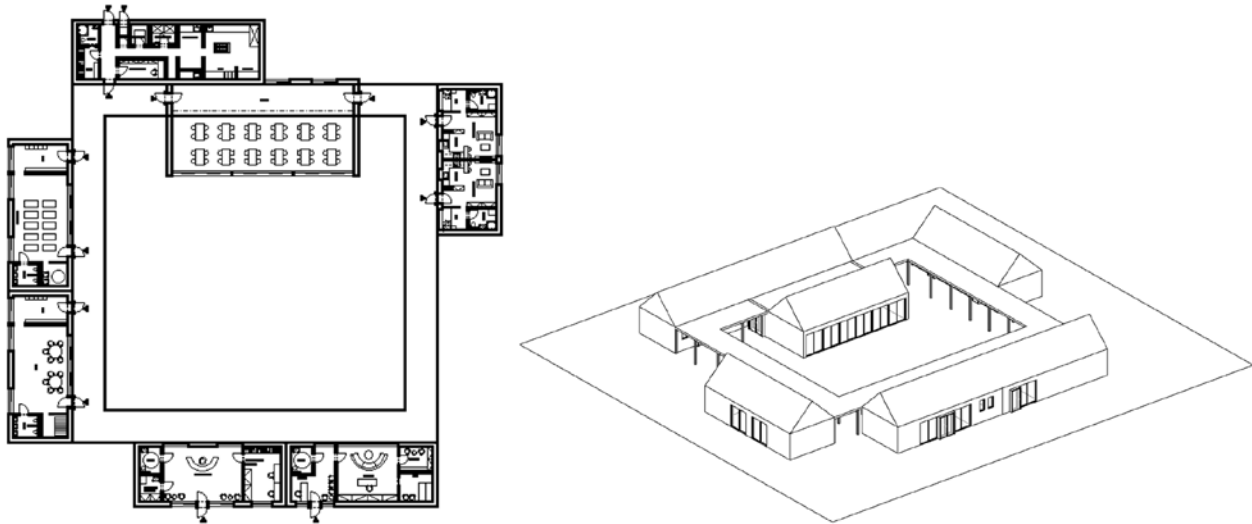


Figure 13, 14: Modular educational centre - a floor plan and axonometry (l-r) (student M. Stašková).



Figure 15, 16, 17: Modular centre of psychological help - floor plans and axonometry (l-r) (student Z. Domaničová).

INSPIRATION FOR TEACHING

The above-mentioned approaches to reconstruction were tested in the student design studio at the STU. It was attended by 14 students in a mixed group of 4th, 5th, and 6th year students. The group was international (ten Slovak students, two from Ukraine, one from Turkey and one from Georgia).

The methodology of conducting the studio was similar (the similarity is due to the fact that it stems from the internal logic of the issue) to that of the practice-oriented advanced training programme CAS Rebuild Ukraine of the Swiss Bern University of Applied Sciences [9], where, as in the Swiss case, in order to learn the knowledge and skills in the most comprehensive, multi-layered and varied approaches, the following forms of teaching have to be used in combination:

1. Face-to-face and on-line teaching - where relevant, different forms of teaching were used to involve all students, as well as lecturers or invited practitioners.
2. Group work and practical exercises - were used especially in the early stages of learning. In this part, there was also a joint brainstorming session and then the preparation of own storyboards by individual students, who also chose the functional content of their objects after their own consideration (Figure 1- Figure 3).
3. Best practice examples - were not only offered by teachers and invited experts, but were actively sought and analysed by the students themselves, and presenting their analyses to others.
4. Input presentations by recognised specialists and experts - experts from practice were invited to the studio, who have experience in the implementation of projects of a similar nature, especially with sustainable low-energy and low-cost construction based on natural, recycled or alternative materials.
5. Experts were selected who incorporated the latest findings from research and development in their work.
6. Discussions and interaction with experts - was spontaneous and very intense not only immediately after their presentations, but also later in different situations during the development of the project. In addition to experts from the construction sector, a psychologist who has experience working with people from war-affected Ukraine was also engaged [10].
7. Coaching and personal support - consultations on student work were conducted individually, but in the presence of other students, with each student being attended to by all the studio's tutors, and thus having the opportunity to be confronted with multiple approaches and perspectives.
8. Presentation of partial results during work in progress checks and a final public presentation. An exhibition will be prepared for the public from the results of the studio work.

It is important to highlight that the whole design process was guided in accordance with the ideas of the New European Bauhaus, an initiative that calls for beautiful, sustainable and inclusive solutions [11][12]. The sustainable approach was described in more detail in previous sections. Regarding inclusivity, the seven basic principles of universal design were followed during the studio work, which are:

1. Equitable use: the design is useful and marketable to people with diverse abilities.
2. Flexibility in use: the design accommodates a wide range of individual preferences and abilities.
3. Simple and intuitive use: use of the design is easy to understand, regardless of the user's experience, knowledge, language skills or their current concentration level.
4. Perceptible information: the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
5. Tolerance for error: the design minimises hazards and the adverse consequences of accidental or unintended actions.
6. Low physical effort: the design can be used efficiently and comfortably and with a minimum of fatigue.
7. Size and space for approach and use: appropriate size and space is provided for approach, reach, manipulation and use regardless of the user's body size, posture, or mobility [13].

Considering the expected higher proportion of people with disabilities in the population after the war, especially important in this context is principle 7. According to it, space design needs to offer a solution that provides a clear view of important elements for each seated or standing user; allows all components to be comfortably reached by each seated or standing user; allows for variations in hand and handle size; and provides sufficient space for the use of assistive devices or personal assistance.

The work results of the student design studio are proposals for individual (Figure 4 and Figure 5), rental (Figure 6) and community housing (Figure 7 and Figure 8), kindergarten (Figure 9 to Figure 12), buildings for education (Figure 13 and Figure 14), and health care (Figure 15 to Figure 17). The students had freedom in the selection of the function of their buildings, but it was done on the base of their research, brainstorming and analysis. They could select design principles, construction methods and building materials according to their preferences, experiences and inspirations. The first evaluation of their work shows that, thanks to the above-mentioned pedagogical approach, they were able to fulfil the requirements of this demanding assignment at a really high-quality level.

CONCLUSIONS

The research of the topic *architecture for recovery* has only started, and the presented results of students' work will be more thoroughly analysed. At this stage, it can be seen that the requirement of modularity, adaptability and inclusiveness is rather a challenge and not a limitation for students [14]. The same applies to the use of natural and recycled materials, the respect of energy efficiency requirements at the passive house level and the architectural integration of the renewable energy sources [15].

It is essential to involve students in projects with a deeper social impact during their architectural studies. This helps them in their professional and human growth. It was also found that involving students from the disaster-affected area helps in their psychological recovery and in building a sense of usefulness and active involvement. They also inspired other students, and emotionally involved them in solving the needs of their war-torn country.

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