ARCHITECTURAL DESIGN-RESEARCH: A PATH TOWARDS AN INNOVATIVE TRANSDISCIPLINARY PEDAGOGY

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INTRODUCTION

This paper focuses on the importance of Architectural Design Research (ADR) pedagogies to impart transdisciplinary learning, responding to contemporary global challenges. Transdisciplinary learning set the agenda and enables students to go beyond the conventional boundaries of architectural design to explore real challenges faced by communities. This study claims that architectural design research provides pedagogical grounds to explore this agenda. The most important question might be "why architectural design research?"

The exploration starts with the idea of Empathy that is at the heart of transdisciplinary learning, it allows students to explore what is important to investigate. In a world that is focused on and is divided by political radicalization and nationalistic agendas, pedagogical approaches around the notion of Empathy would bring changes on the community level that can trigger an impact on the society.

Another key aspect dictating the idea of transdisciplinary learning is the reflective practice, rooted in Schön's concept of "reflection on action"[1], it allows students to critically analyse their learning process. Blythe and Schaik[2] discuss that reflection is part of the designing process. In this study it is used as a tool to steer students towards empathetic thinking and to be more responsive to all cross-disciplinary requirements of the project, including social, cultural, contextual, environmental, political, technological, economic, historical, and philosophical approaches. So, critical thinking helps to understand the architectural design research process as a methodology or in this case as a pedagogy, that helps achieve transdisciplinary learning. Figure 1 provides a relationship of the ideas of empathy reflective practice, and design research and shows how ADR is at the heart of transdisciplinary learning. ADR is conceived as a set of exploratory tools, techniques, and methods for producing new design knowledge conceived as innovative solutions to challenging, open-ended, and rapidly-evolving contemporary crises. The process of Designing could only be intended as Research when it produces new knowledge that would go beyond site-specific solutions, called design projects, and the new knowledge thus produced could be replicated elsewhere, always under an adaptative process to new contexts.

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[1] Schon, Donald A. "How professionals think in action." The Reflective Practitioner (1983).

[2] Blythe, Richard, and Leon van Schaik. "What if Design Practice Matters?" In Design Research in Architecture, pp. 53-70. Routledge, (2013).

This study explores how this architectural design research pedagogy is perceived and practiced in the two scenarios of Masters in Architectural Design (MA AD) at Welsh School of Architecture (WSA), Cardiff University, UK, and 3rd-year studio at the Department of Architecture (DoA), University of Engineering and Technology (UET), Lahore, Pakistan. Finally, it will discuss the findings in the two contexts that provide opportunities for new explorations in the Architectural Design Research (ADR) pedagogical field.
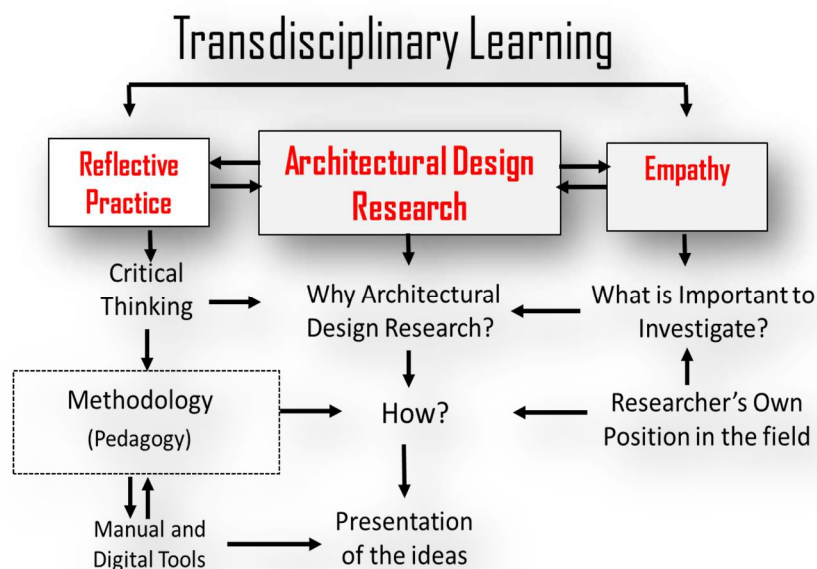

Figure 1: Relationship between transdisciplinary learning and ADR

LITERATURE REVIEW AND THE RESEARCH GAP

This study explores the importance of ADR in the literature and discusses its importance as a theoretical framework as well as a pedagogical approach.

Frayling's[3] triad of architectural design research analyses the relationships between research and design, focusing on their different 'into', 'for', and 'through' links. "Into" design research would mean looking into the precedent, and "for" would mean to research for design intervention. Whereas "through" design research is taking a problem from the world outside the boundaries of architectural design and using design to address this problem. It deals with the "otherness", the issues of society not often looked into through conventional design practices. This idea is strengthened by Fraser[4], where the role of ADR is highlighted as a critical practice, it makes a case for ADR being a legitimate research area in its own right that produces new knowledge. Coyne[5] supports the transdisciplinary nature of ADR by saying that architecture draws inevitably from disciplines outside its immediate orbit. He explains that design-led research seeks to understand the world and develop exposure to the "others" such as other cultures, through direct intervention by the researcher.

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[3] Frayling, Christopher. "Research in art and design (Royal College of Art Research Papers, vol 1, no 1, 1993/4)." (1994).

[4] Fraser, Murray, ed. "Design Research in Architecture: an overview." (2013).

[5] Coyne, Richard. "Even more than architecture." In *Design Research in Architecture*, pp. 185-204. Routledge, 2013.

Till[6] talks about the misconceptions about design research over the years that treats ADR as an alien entity that cannot be seen in conjunction with other disciplines, or in contrast a field that needs to seek validation from other disciplines, or finally a field so different that cannot conform to the normal practices of research. In contrast, Till explains that design research works with real-life issues by defining the particular paradigm and methodologies for each inquiry, hinting at the transdisciplinary nature of ADR. Moreover, he also provides a pedagogical way by stating that it should be conscious of the interactions of different functions of a building, including buildings being structural entities, environmental modifiers, and function socially, culturally, and economically. Verbeke[7] identifies the re-iterative process of ADR by saying that design research conceives the action of designing as a vehicle to develop an understanding of issues and for advancing knowledge. Design research is not a linear process, it has to be updated and modified repeatedly, results are used to gain knowledge and insight for further improvements, and this ever-lasting refining process never stops. New knowledge is generated through this process. For Verbeke, that is the key difference between design research from conventional research.

In this reiterative process of knowledge generation through design research cycles, literature talks about the "knowledge input" that is to learn from the pre-existing knowledge which marks the starting point of a design research process. However, a detailed literature review highlights that the importance of this pre-existing knowledge or 'state of the art' of a topic that would be explored by a literature review process hasn't been explored deeply enough. This identified gap in the existing literature on architectural design research is what this research seeks to address. The focus is to explain the authors' experience with their ADR pedagogical approaches for the production of new knowledge and to promote transdisciplinary learning through a detailed analysis of the two contexts (MAAD and UET). Within this context, the role of the design research literature review processing will be discussed in detail.

DESIGN RESEARCH AS A TOOL TO PRODUCE NEW KNOWLEDGE

How the discipline of Design might be used for producing replicable knowledge beyond its site-specific contexts? How would this innovative knowledge produced by design be able to respond to contemporary challenges such as climate change, migration, social inequality, political radicalization, and urban conflicts? As a first step for responding to these questions, a preliminary exploration of the multiple relationships between design and research, grounded on Frayling[8], has been outlined as follows:

1.   **Linearity from Research to Design:** A well-established conventional approach explored for decades and present in a number of Postgraduate Masters in Architectural Design and other MA in Urban Design worldwide. This approach is based on design decisions justified by previous conventional research outcomes. The research appears here as a distinctive realm from design, so it could not be considered design research.

2.   **Design as the idea's test-bed, or 'design laboratory':** This second approach places design as a core knowledge-producer through the elaboration of iterative cycles of 'Design Scenarios', where conceptual ideas are tested through design in accordance to specific contexts. These successive design explorations, conceived as conceptual and contextual 'test-beds', are diagnosed and refined in multiple iterative cycles.

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[6] Till, Jeremy. "Three myths and one model." *Building Materials (Dublin)* 17 (2007): 4-10.

[7] Verbeke, Johan. "This is research by design." In *Design research in architecture*, pp. 137-160. Routledge, 2013.

[8] Frayling, Christopher. "Research in art and design (Royal College of Art Research Papers, vol 1, no 1, 1993/4)." (1994).

The starting point is the Architectural Design Research translation of ideas extracted from the student's initial literature review into space, program, tectonics, or conceptual, systemic, and relational diagrams. In the next section, a detailed explanation will be given about how the design research processing of the students' literature review could lead to these successive and incrementally-refined design scenarios.

3.   **Design as Research in its own right:** In some cases, the action of designing might constitute research in its own right. For reaching this innovative level by the direct action of designing, the design researcher should have previously reached an advanced intellectual position that would include a previous extensive knowledge of the research topic(s). In addition, a thorough acknowledgment of the multi-layered nature of this context would also be required, including a long-standing experience and close contact with its inhabitants and engaged stakeholders.

OUR DESIGN RESEARCH PEDAGOGY
The pedagogical approach presented in this paper aims to train the students in four subsequent stages from the design research processing of their literature review to the architectural design research production, articulated in successive and incrementally-refined iterative cycles (Figure 2). Within this context, the role of their first initial literature review design research processing is two-fold: on the one hand, it is conceived as a way of gaining knowledge over the 'state of the art' of the students' research topic derived from their previously-formulated Research Questions (RQs), which would include works of built and unbuilt architecture relevant to their research topic, seen as equal references to journal papers or books. On the other, it constitutes a means for identifying the gaps in knowledge (RGs) of the student's research topics. It is within the territory of these RGs where the students' Research Questions (RQs) should be reformulated for enabling a thorough investigation of these unexplored territories, supported by a more detailed and specific second literature review located at the edges of their RG. Under this approach, the students' RQs and related RAs will be conceived as advanced versions of what they would have called their 'design concepts' during their previous conventional architectural studies. As such, the students' successive 'Design Scenarios' should respond in coherence with these Research Questions (RQs) and related Research Aim (RA). Additionally, and in parallel to this process, their RQs and RAs will constantly evolve and be reformulated several times according to the students' learning journeys. In each of these iterative cycles, their conceptual and contextual frameworks will be revisited and informed by new ideas coming from a deeper and more specific literature review, and from additional layers of understanding and interpretation of their sites and contexts. The conclusion of these cycles will be reached when an adequate level of architectural design research quality will be achieved, able to respond to the students' refined RQs and close to their final RA. This methodological framework allows a resilient approach from multiple conceptual standpoints and site-specific constraints and challenges. It has been successfully applied for several years in the different Design Research Units of the Masters of Architectural Design (MA AD) at the Welsh School of Architecture (WSA) , with excellent and varied results.
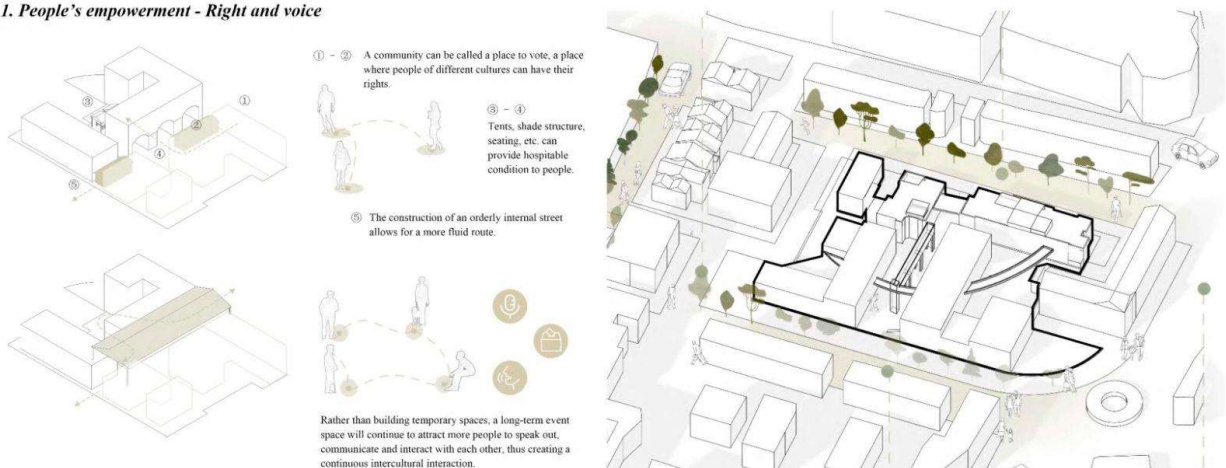The four stages (Figure 2) could be summarised as:
Stage 1. ADR literature review processing. From the ideas processed in the Literature review to its architectural translation. There are at least four different ways of translating in architectural terms the ideas from each student's literature review: spatial, programmatic, material, and tectonic translations, and as well conceptual, systemic, and relational translations, which would be expressed graphically with diagrams.
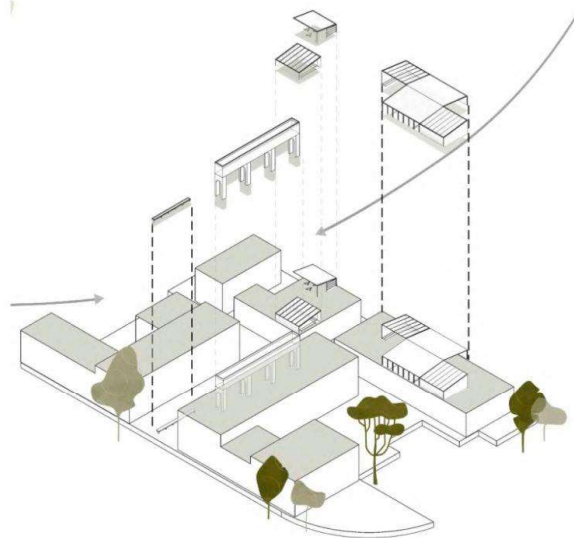At this stage, the students should extract the most relevant ideas from their literature review and translate them graphically or with physical models into architectural terms. Sometimes, these ideas could be translated into varied spatial atmospheres or spatial organizations. Sometimes, the ideas are related to the definition of a programme of permanent uses and/or temporary activities. In other cases, some ideas could express material approaches and how a material or materials could be assembled together for articulating a specific architectural language able to express what the project is about and is looking for. Finally, some ideas, while relevant for the topic and for its architectural expression, could remain

From the Literature Review processing to the D-R iterative process of the architectural production: The Four Design-Research (D-R) Steps

1. People's empowerment - Right and voice

① - ② A community can be called a place to vote, a place where people of different cultures can have their rights.

③ - ④ Tents, shade structure, seating, etc. can provide hospitable condition to people.

⑤ The construction of an orderly internal street allows for a more fluid route.

Rather than building temporary spaces, a long-term event space will continue to attract more people to speak out, communicate and interact with each other, thus creating a continuous intercultural interaction.

Stage 1. D-R Literature Review Processing: 4 different kinds of architectural translations of the ideas from the literature review.

Stage 2. Filtering + Adapting: Stage 1 D-R translations to the specificities of your site and context, including its people.

Version IV
Stacking & Terrace

+

Version III
Center connection

+

Version II
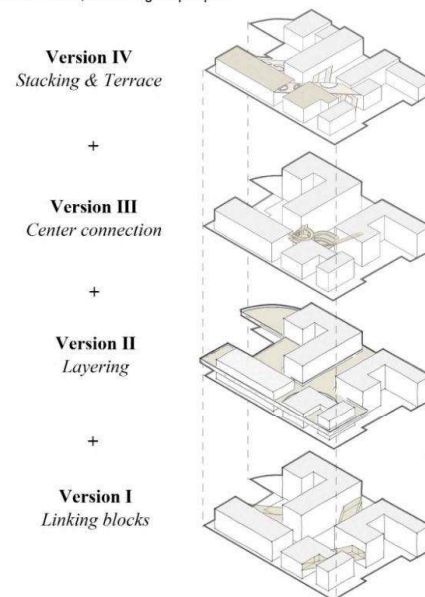*Layering*

+

Version I
Linking blocks

Stage 3. Assembling:
Stage 1 D-R translations that have been filtered + adapted to site + context in Stage 2 will be assembled together in coherence to RQs and RA.

Resulting in a coherent
First D-R preliminary proposal.

Stage 4. Diagnose:
First D-R preliminary proposal diagnosed/self-assessed, according to:
· The students' RQs and RA
· The main ideas from their conceptual framework
· Their responses to their site and context's challenges, including people's needs.

Iterative Cycles of the four D-R Steps: increasingly refined proposal.

Figure 2: The four stages in ADR Process from the literature review processing to the iterative cycles of architectural production

theoretical or systemic and thus would require drawing or model-making diagrams that would express and clarify the project's conceptual approach(es).

Stage 2: Filtering + Adapting. These translations will be confronted with the projects' site-specific requirements. This would be done through a series of 'Applicability Drawings' conceived as a filtering process where the contextual relevance of these translations will be tested. Subsequently, the ADR translations identified as relevant will be adapted to the context, including its local people's visions and needs that could participate in co-design processes.

Stage 3: Assembling. Those contextually-adapted translations will then be assembled together, in coherence with what the students' project is looking for, as defined by their RQs and RA. This assembling process could be compared to the conventional design process at the stage when different kinds of spatial, material, or programmatic design decisions are combined together in coherence with the project's 'design concept'. In ADR, the coherence of this 'assemblage' process is given by the RQs and related RA, and would result in a first preliminary ADR proposal.

Stage 4: Diagnose. This first proposal would be then self-assessed or diagnosed from a reflective practice approach[9], according to the extent of its success in responding to the students' RQs and RA, the relevance of the ideas forming its conceptual framework, and the quality of its responses to their site and context's challenges. The outcomes of this self-assessment-diagnosis will result in positive architectural outcomes to be kept and the identification of potentials not fully developed, mistakes, weaknesses, and gaps in knowledge. The conclusions of this diagnosis will give clear guidance on what needs to be revisited in a second ADR proposal: improving the depth and accuracy of the literature review's references and its associated ADR analytic methods and/or revisiting the contextual analysis by incorporating more subtle elements that were not fully addressed on the first ADR proposal.

This would result in a second iterative process by revisiting again these four ADR stages, to come up with a more refined, sharper, and higher quality architectural design research proposal, that would be the students' second version of their ADR project. This iterative process, as explained in Figure 3, will be developed in several cycles until the students' will reach an advanced and high-quality ADR project at multiple scales, able to respond to the final version of their research questions and research aims.
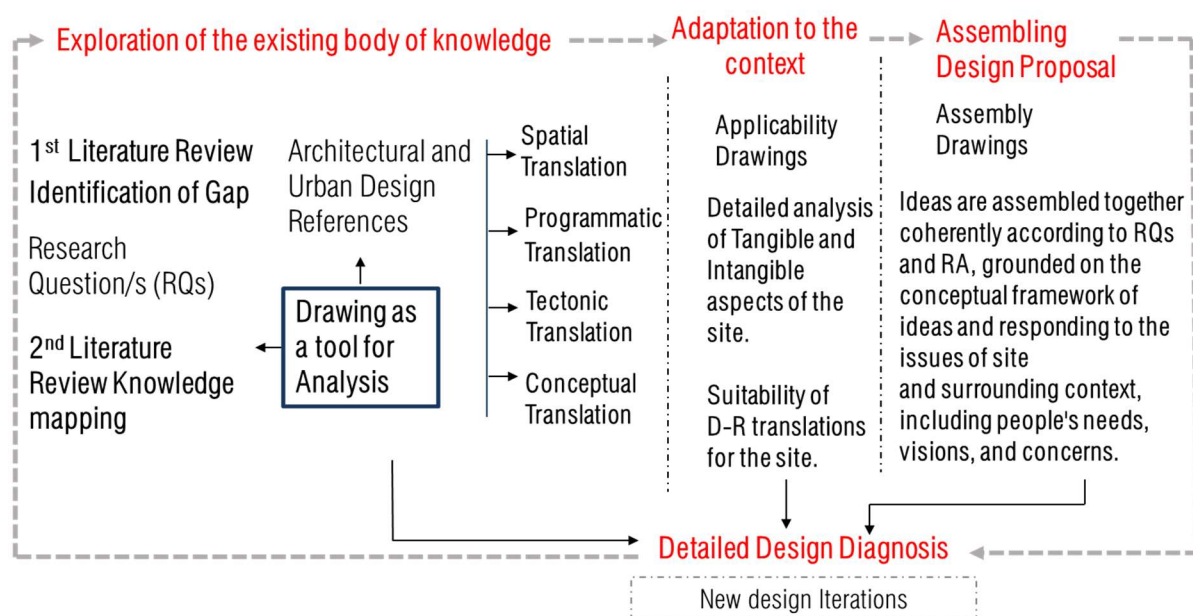

Figure 3: The iterative cycles of the four steps ADR Process

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[9] Ehn, Pelle, and Peter Ullmark. "Educating the reflective design researcher." *Practice Based Design Research* (2017): 77-86.

IMPLEMENTATION OF DESIGN RESEARCH PEDAGOGY IN PAKISTAN'S CONTEXT

The implementation of ADR pedagogy in the context of DoA UET, Lahore, Pakistan, is a very different and much more challenging experience as compared to MA AD. In addition to the challenges of the implementation of ADR tools discussed above, there are some added layers of complexities. The most important of these challenges is breaking the stereotypical approach toward what is believed to be design research. In the conventional practices of architectural learning in Pakistan, students are encouraged to conduct some research at the beginning of the project. This research, however, is focused on informing the design decisions, as Frayling explained, this is research "for" design and does not focus on generating new knowledge "through" design. Also as mentioned above in the section "Design research as a tool to produce new knowledge" this practice represents linearity from research to design and cannot be identified as design research. However, teachers and students alike consider this to be the architectural design research, so, the difficulty is introducing the non-conventional and innovative approach of ADR in this context.

Moreover, students' demographics and their early education play a very important role in their perception of design research. In Pakistan, early education is very stratified based on the socioeconomic classes[10], students with expensive private education tend to be more focused on critical and reflective thinking. Whereas the public early education system is based on rote learning, failing to inculcate critical thinking abilities[11].

These students tend to perceive learning as an objective process, with a focus on the tangible aspects of architectural design, for example, space planning, tectonic strategies, etc. There is some focus on understanding the issues in society, however, it is often considered an extra aspect of architecture or not explored deeply enough. Moreover, often the final design interventions are devoid of representing these issues. So, when the students are taught the importance of empathy and to focus a big part of their research on the issues arising from it, a feeling of distrust is found among them. A feeling that this is not the "real architecture" and the perception that they should be designing large-scale complex structures with a focus on aesthetics and function. This approach not only shows the negative effects of a lack of critical thinking abilities but also represents a colonial mindset. Here the focus is not on creating architecture as an answer to real-life issues in the local context, but to create architecture that fits globally, an attempt to conform to the beauty standards of the west. The new wave of so-called digital design in Pakistan is an example of this colonial mindset where students are encouraged to use the latest digital tools without questioning the purpose of final interventions and how they are responding to the local context. The issue is not to take inspiration from the global context, in fact, ADR strongly encourages approaching the world knowledge, the issue is not to translate this knowledge to the local context.

Moreover, the learning process in architectural studios in Pakistan is based on the Mystery-Mastery approach (Argyris, 1981). The absence of clear pedagogical methods and the lack of discussion among tutors and with students about the issue of learning leads to students having to figure out the mystery of becoming the masters of design. Here the stratified early education plays a big role and students with pre-existing critical thinking abilities as well as English communication skills, resulting from their expensive early education, tend to excel in the studio.

ADR is a solution to decolonize the learning process and impart the post-colonial and critical thinking abilities in students. In this study third-year, DoA UET students were given a project where they can start to inculcate the social and cultural issues by being closer to the local communities, they were encouraged to practice empathy and observe what design interventions would be needed in these communities (Figure 4, a). To induce critical thinking, they were taught to use drawing as an analytical tool to report their findings from the case studies and literature (Figure 4, b). They learned to produce the final interventions in response to these findings (Figure 4, c), and finally to reflect upon these interventions as part of a detailed design diagnosis (Figure 4, d). However, they did not get to work on the reiterations of their design interventions.

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[10] Iqbal, Mamuna, and Andrew Roberts. "Teachers' perception of students' performance in the architectural design studio in the light of Bourdieu." *British Journal of Sociology of Education* 40, no. 8 (2019): 1154-1169.

[11] Iqbal, Mamuna, Usman Awan, and Mutahir Awan. "JRAp." *Department of Architecture & Planning, NED University of Engineering & Technology, City Campus Maulana Din Muhammad Wafai Road, Karachi.* 31, no. 2: 38. (2022).

In the next phase of this study, the researcher will work on how to better work on creating mutual trust and understanding with and among students for ADR learning, also the project will be designed in two semesters to allow the reiterations of design.
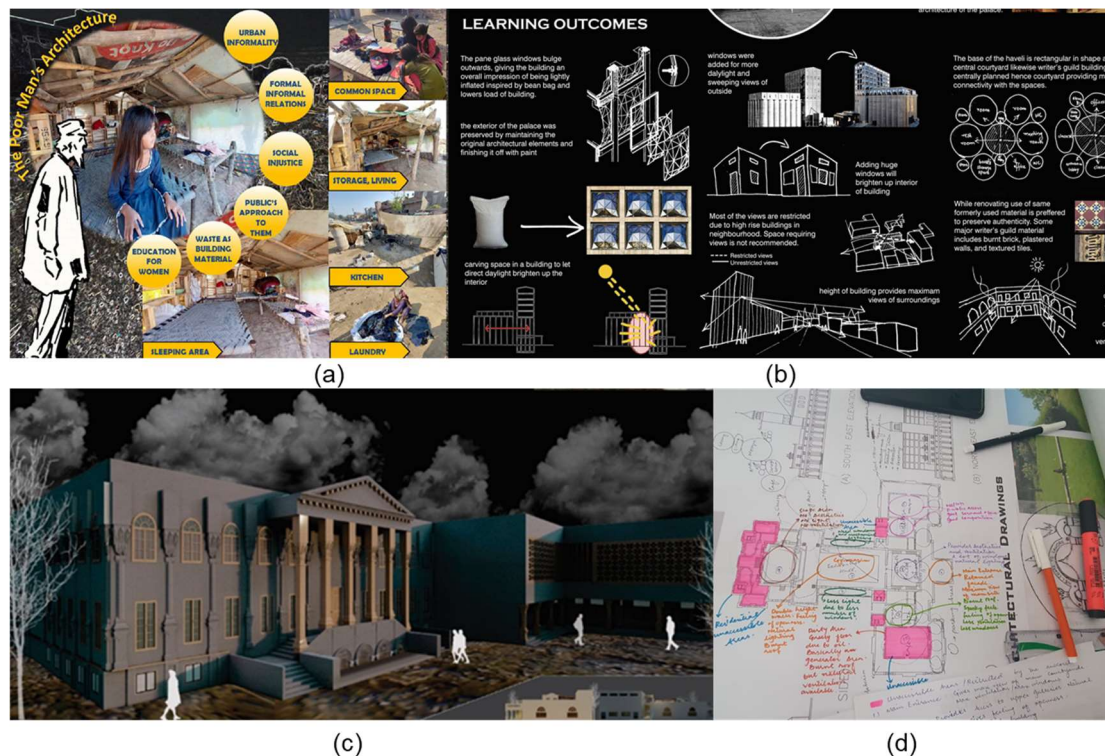

Figure 4: Examples of students' work from DoA UET

FINAL DISCUSSION AND CONCLUSIONS

The importance of design research as transdisciplinary pedagogy becomes clear form the literature, this current study takes this idea further and emphasizes on the importance of design research as a mean to produce new knowledge. As an original contribution, it highlights the role of literature review and the way it contributes in the four steps of design research. The implementation of these four steps in two context (Cardiff and Lahore) highlights its potential as an innovative pedagogical method for transdisciplinary learning. However, the issue arising from the implementation of this pedagogical approach in Lahore's context, as well as for overall better understanding of the potential, limitations, and the different directions this pedagogical method can take require further investigations.

To move further, the institutional collaboration between MA AD WSA and DoA UET discussed in this paper is in the process of being reinforced through the preparation of a proposal for an international academic collaboration funding programme of the Welsh Government. The proposal aims to promote a transdisciplinary collaboration in research and teaching between Architectural Design Research pedagogies, urban design, architectural cooperation projects, sustainable architecture and low carbon strategies, and heritage preservation.

For the last three years, MA AD has conceived a series of ADR Pedagogic Labs aimed at sharing Architectural Design Research pedagogic experiences, and at promoting intellectual debates with the MA AD team and the involvement of international academics. This forum has been shared with DoA

UET, with a stable and active participation of Dr. Mamuna Iqbal. Data generated from this pedagogic lab has provided the first set of information for the current paper that was explored further through its implementation in the two contexts. As a next step, the authors of this article are preparing a journal article on a detailed comparative study between recent experiences in western Europe and Pakistan in ADR pedagogies and the different collaboration strands that have been envisaged for the future. This would be the first step toward the preparation of an application for a Research Project on post-colonial approaches to ADR pedagogies.

A joint MA AD-DoA ADR Unit is being conceived for next 2022-2023 Academic Year, focusing in Lahore as the intervention context and working with local communities on heritage reactivation as a socio-economic catalyser, from socially-inclusive and intercultural approaches related to contemporary architecture. This would set up the grounds for a joint application on Architectural Design Research methods applied to contemporary approaches in socially-inclusive heritage, to funding bodies such as UN-Habitat, the World Bank or International Cooperation Agencies.

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