MULTIPLE DIMENSIONS OF RESEARCH, PRACTICE AND EDUCATION IN ARCHITECTURAL ACADEMIA

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Abstract

Architectural education, research and practice have a tripartite relationship, wherein all the spheres are mutually dependent on each other. The paper explores the multiple dimensions of this dynamic relationship and the benefits arising out of closer interaction amongst the spheres.

The paper studies a spectrum of approaches which may be adopted in this direction. It discusses the shifts required in architectural pedagogy to enable holistic learning, approaches to thinking, alternatives in design communication and the inculcation of research culture at academic level. The paper stresses on the need to identify research as an important subject in education and as the tool for innovation and meaningful design.

The exploration of practice sphere in reaching out to the other spheres is elaborated by means of a case study of a design practice wherein practice sphere merges with its neighbouring spheres by adopting 'Research through Practice' as well as involving and educating the student community.

Keywords

Architecture; Research; Practice; Architectural pedagogy; Research through Practice

1 Introduction

Beyond the physical environment it creates, architecture has a wider role in the world around us. The arrangement of spaces and their integration with natural light, air, landscape, materials and textures have the ability to impact individuals at a psychological level. Users can feel a connection to the spaces and their emotions can be evoked. Architecture is a representation of the culture and values of society at a given

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time. It is a reflection of society, but also has the potential to shape society itself. Mindful designs can resolve pertinent social and ecological problems of the current times.

"Design is not just a building, an interior or a preserved landscape; it is a means of acting in and transforming the world" said Michael Speaks.

In this light, architects have to recognize the above-mentioned roles of architecture and begin to design with a set of values to achieve them. The complete ecosystem of education, research and practice, herein referred to as the three spheres, will have to work in tandem to collectively create the desired po`sitive impact. Architectural education is the place where a shift in thinking can be seeded into the young minds. Research is an important tool to understand, introspect and innovate. Practice can convert research insights into tangible products to benefit the individual users and society. Architectural discipline demands a closer interaction between the three spheres for its advancement. A systemic shift is possible by integrating small changes in every sphere, which can eventually strengthen the entire architectural ecosystem.

2 A web of interaction: Architectural academia Practice- Research

This web of interactions is represented in Fig. 1. The three spheres are inseparable and work in a mutually beneficial manner, one contributing to the growth of the other.

Architectural research supports education both directly, through research training of future architects, and indirectly, by providing for the continual advancement of the discipline (Milan, 2011).

Professional practice, backed by the insights and findings from research, delivers value added design products. Quality in the profession is directly related to a strong academic ecosystem.

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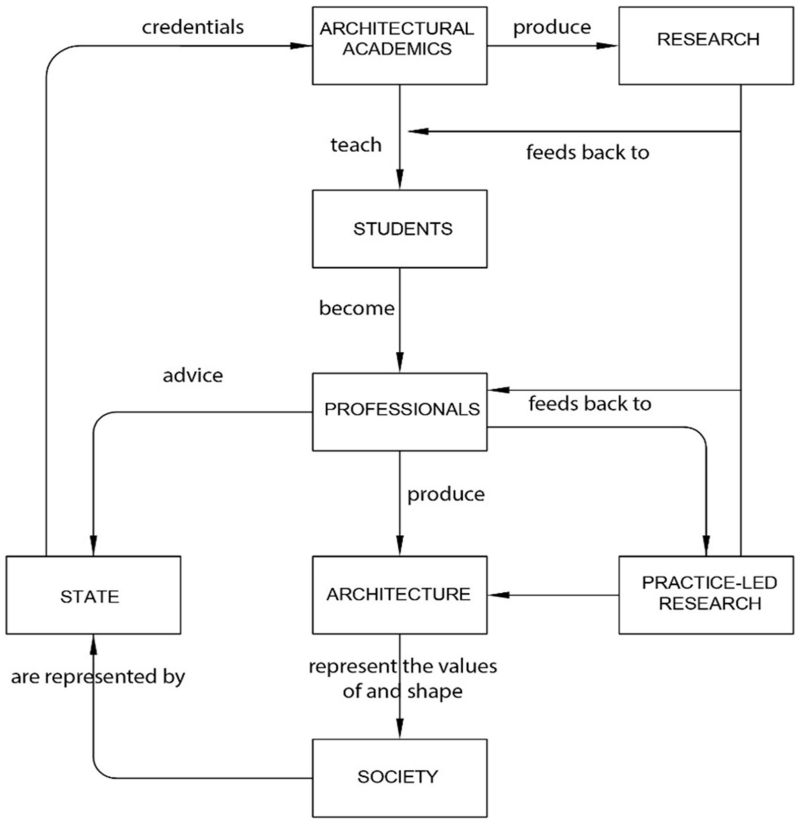

Figure 1 : Web of relationships: Academia-Practice-Research
Source: Modification and adaptation of figure from 'Journal of Architectural and Planning research's 1998

Researchers receive feedback by observing the real time products created on the basis of their research, which acts as a reality check to understand any gaps between theory and practice. Researchers and practitioners contribute to education by sharing their expertise with the student community. The proximity of education, research and practice is essential to mutual growth of the spheres.

The current system: Challenges in the research sphere.

3.1 Need for research in architecture

Research is the fundamental tool to increase the knowledge base of any discipline. Excellence in Research for Australia ERA defines research as the creation of new knowledge and/or use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings. (Frayser, 2013). Research allows us to re examine existing knowledge, thereby modifying our understanding of the world in the light of new findings.

The Royal Institute of British Architects (RIBA) recognizes "the intimate relationship between research and design innovation." Architects must understand the value of research in their design. Research provides a meaningful path or direction to take the process of design forward.

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3.2 Ambiguity in 'Research through Practice'

Currently, two broad categories of architectural research are recognized. One is the traditional 'scientific' approach or academic research. The second is the 'Research through practice', a body of knowledge evolving through the experiences and experiments of individual architectural practices. Research driven by practice is largely undocumented and many times, architects do not even categorize their creative processes as research.

There is an ambiguity on what processes and knowledge qualify as 'Research through architectural practice'. Some interesting reformulations have been done by Lawson concerning how we should assess research when we no longer can rely on a 'scientific method'. The central question is then: "How has the work contributed to what is considered good and useful knowledge by those working in the field?" (Frayser, 2013). Mapping the contributions to knowledge made by practice-based research remains a challenge today.

3.3 Lack of research work

At the academic level, the quantity and quality of research work produced in the field of architecture is only a small fraction of recorded research in other disciplines. There is a general lack of emphasis to conduct architectural research. Attitudes to research and knowledge exchange appear to be rooted in architectural education, learning styles and preferred communication methods, which are primarily visual and peer-to-peer.(Buday, 2017)

4. The current system: Challenges in the education sphere

4.1 Model of architectural education

Historically, architectural education began as an apprenticeship based model where young architects were trained under practicing architects. Currently, architectural education follows the university based model, with emphasis on the design studio. Students are exposed to real time practice through internship with architectural practices as part of the curriculum. A studio is a workspace where students explore a set of skills with or without the presence of an instructor. The design studio is a physical environment where students are primarily taught various aspects of design education. (Lueth, 2008)

There has been much debate on what model of education is suitable for the discipline. One group criticize the studio based system of education for its inability to prepare students for the real world of practice. The students are incapable of drawing or understanding the realities as they have been designing in the closed constraints of a fantasylike studio atmosphere that does not mimic real-life settings. (Stevens, 2014) Others argue that the role of a formal university education cannot be undermined as it is the place of orientation, enquiry, and understanding of the subject without the pressures and limitations of practicality. The current system integrates both practical training and theoritical learning, but there is a lack of research training in its model.

4.2 Pedagogical organisation

Architectural education, in general, focuses on the design product rather than the process of design. In many cases, evaluation and

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inputs tend to be based on the subjective viewpoints of the mentors due to the nature of the subject which is viewed differently by different people through the lens of the their own experiences and standpoints.There is a common tendency to neglect students' experience and process of learning during assessments. Furthermore, assessment criteria of the studio instructors may not be explicitly stated.(Cikis & Cil, 2009) .

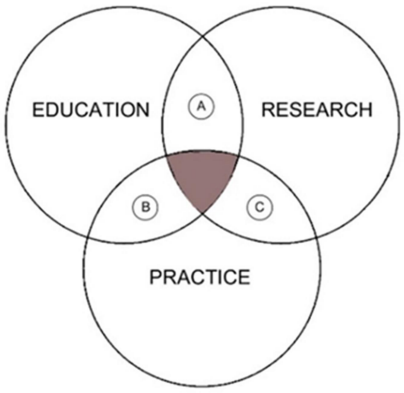

Figure 2 :Scope of overlap of the spheres
Source: Author

5. Scope of overlap and outreach

For a holistic and all rounded advancement of the discipline, it is necessary to create a better knit network of academicians, researchers and practitioners. Refer Fig. 2. The possibilities of outreach of each sphere into the adjacent spheres is discussed below.

Confluence of the three creates architecture of highest potential

5.1 Education sphere

Academic education plays a vital role in orienting the students with the required values and culture, apart from the subject knowledge. In this context, one needs to enquire on: "What are the approaches to provide a well rounded holistic learning experience to the students?". "What are the tangible measures one can adopt at the studio level to balance out on the subjective nature of architectural pedagogy?"

Inculcating the attitude of research through university culture

Education must kindle in students a curiosity and the urge to explore, or in other words, research. A faculty led research environment is critical for students to imbibe the culture of research culture. Students learn effectively by assisting the faculty, who themselves are producers of research work. Architectural schools should explore the introduction of formal classic research methodology as part of the curriculum. Methods of conducting research, analysis and interpretation of the research conducted by peers, writing and communication of research work, should become a part of the syllabus.

Students will have to conduct research work relevant to their design coursework which will assist in developing the design. Research can form a useful tool for decision making at different stages of the project, providing direction to the designer. Modes of communicating designs can shift from graphic-only representation to a hybrid form

including writing. Students may learn to

A	Academicians conducting research at universities. Research as a primary subject in education
B	Practical training through internships for architecture students. Professionals teach at colleges as Visiting Faculty.
C	Research positions at professional practice. Research through practice, its documentation and dissemination.

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represent their research, reasoning in design, impact assessment of proposed design in addition to graphical representation. Such paradigm shifts in method of learning can ensure integration of research and design in the formative years of a student's life.

Inculcating the approach to thinking and exploring alternatives

An important skillset of an architect is to be able to think of creative, fresh and alternative solutions for the old problem.

"You cannot dig a different hole by digging the same hole deeper"(Bono, 1960)

By thinking extensively in the same method, one may not be able to arrive at better design solutions. Lateral thinking is concerned with the creation of new ideas, methods, processes and products. Vertical thinking is a sequential thinking process that helps develop the chosen concept. The two forms of thinking are complementary and need to co-exist for sensible progress. Fortunately, thinking skills can be shaped and developed by consistent practice. Schools may focus on sharpening the lateral thinking capabilities of students,which can have far reaching effect on innovation in architectural practice sphere.

Discussion at the studio can move away from personal preferences and lean towards design intents to overcome the problem of subjective discussions. The 'Why factor' of design must assume importance, where students explain why they have designed something rather than what they have designed. The emphasis should be given to the process of design and not the mere product. Students of architecture must be encouraged to explore different design alternatives and conducting a detailed analysis of the options in terms of the pros and cons, expected experience, building performance, environment impact, social impact etc. before taking a decision on the design path. Such an education will be a better foundation for nurturing the future architects who may adopt similar approaches in their design practice or research at a later stage.

5.2 Research sphere

A vast ocean of research is continually conducted by various architectural practices. There is a need for architectural practices to associate with research specialists to document, map, analyse their practice based research. A method can be developed for sharing the insights thus developed for use in further products within the organisation and such tested knowledge can then be shared in external platforms for benefit of the larger community. A set of definitions of standards need to be framed in such a way that they are sufficiently rigorous to secure the quality of research, but sufficiently inclusive to allow all subjects to find expression within them.(Nilsson & Woyseth, 2008). Another measure to strengthen the research sphere can be framed by incentivising the practices conducting extensive research. Medium and large size practices may report their expenditure on Research and Development to the Council of Architecture annually. The Council may provide credits and recognition to reporting practices on its platform. Potential clients, seeking architectural services, will be able to use this information to make an informed choice.

Researchers need to actively participate in education sphere to inculcate the need for research and methods to conduct it. Published research work must be discussed and debated on relevant forums to increase its exposure to a number of architects and thereby put its findings to use through architectural practice.

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5.3 Practice sphere

Practical training modules introduce students of architecture to real time challenges and expose them to various aspects of professional practice. Practicing architects also contribute to formal education by teaching as Visiting faculty in architectural schools, thereby mentoring students through the filter of practical expertise. Practicing architects may employ creative methods of exposing students, such as conducting workshops on various aspects of professional practices, arranging site visits, organising 'open days' where students are invited to experience the office environment.

There is much to gain from architectural knowledge, but it requires a cultural shift in collaborations, not just between academia, practices and clients but also between disciplines and organisations beyond architectures traditional concerns.(Samuel & Dye, 2015). Collaborations and idea exchanges within the three spheres and also across disciplines can broaden the perspectives of designers and fuel design innovations.

6. Case study: Outreach of an architectural design practice

Objective of study: To understand the scope of outreach to other spheres beginning from the Practice sphere

Name of architectural design practice: Mud Hands, Bangalore, Karnataka
Method of study: A design project conducted by the practice was studied and its impact on education and research sphere was analysed.

The architectural design practice employed the method 'Research through Practice' as a tool for designing. This process involved ideation, exploration, research and development as a back and forth before implementation of design in real time. Once new conclusions were reached, the knowledge was shared with beneficiaries by means of workshops, internships, publications and other educational tools. Student interns and young architects conducted research under the guidance of the design firm.
Project : An exploration in flat roofing system
The primary objective of the research was to explore alternatives in flat roofing systems. Reducing the use of steel and cement in the roof component was the key criteria to be fulfilled by the alternative methods. After studying the existing practices as well as traditional roofing techniques, the use of high compression bricks to create flat roofs called as funicular roof was explored.

The flat funicular brick roof was first implemented in a school project at Mysore to

Figure 3: Funicular brick roof at project site, Mysore. First: Construction detail; Second: View of entrance canopy; Third: View of structural system, **Source:** Author

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cover a semi open area of 158 square meters. The roof was sub-divided into 13 roof bays, each containing a brick funicular roof. The bricks are laid at an angle in concentric circles starting with the outer most layer. In comparison to a flat RCC slab of the same area with 150 mm thickness, the reduction in steel consumption achieved was 60% and the reduction in concrete was 50%. The maintainance of the roof was reduced as there is no requirement for further surface treatment such as plastering and painting.

Exploring alternatives

I. Shapes: Variations in the basic shape of the funicular roof was explored, where basic circular shape was replaced with triangular, semicircular, hexagonal and square. Such experiments were developed and tested by preparation of miniature scale models. The load carrying capacity of the roof and its stability were analysed in the various shapes and spans.

II. Binding: The binding material between bricks was also varied from wet mortar using cement to dry mortar using high compressive strength course and fine aggregate.

III. Design: Design explorations evolved around supporting framework for the roof and subtracting the inner layers of bricks to create central skylit openings within the funicular roof. Methods of supporting the roof was varied based on context. The funicular roof has been suspended from a central support pole in one case and embedded within the concrete slab in another case as seen in the Fig 3.

Outreach to education sphere: The experiments were published online on blogs and shared with students and architects across the country by conducting several hands-on workshops. The school project site was kept open for site walks and observation by students. The entire knowledge on the roofing system has been kept open source. Seminar on the roof form and its exploration was given at different architecture colleges in India.

Findings from study:

- Hands on experimentation and research can open up new possibilities which can improvise the existing system. Practice sphere is an ideal platform to begin research where the results can be implemented and experienced in the projects of the firm itself.
- Building awareness amongst clients is an important role of a design practice through which society becomes better informed about the roles and importance of the profession. The client was explained the pros and cons of the alternative roofing

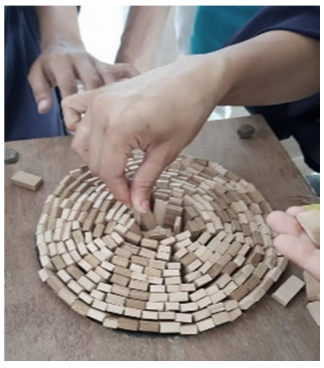

Figure 4: Design and structural explorations in the flat funicular roof system using scaled models; Introducing students and architects through hands on workshops. **Source:** Author

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system and was able to make an informed choice.

There need not be exclusivity in roles but instead multiple roles are possible, that is, a design practice can also be an education and research platform at the same time. Thus, a continual cycle from research to practice to education is established.

8. Conclusion

Strengthening the links of education, research and practice by blurring the traditional boundaries maintained by the spheres can enable architecture to make valuable contributions to society. Efforts of reaching out to other spheres can be explored by all three groups. Knowledge sharing between spheres is important to fuel perpetual innovation.

Grass root level shifts in architectural pedagogy is essential to initiate far reaching effects on the entire architectural discipline. Research must be introduced as a primary subject of study within architectural education. Architects must be skilled to represent their design research, intents, critical analysis and impact assessment for their design proposals and must use a similar approach in their design practice. Research is a necessary tool for better design and its integration with both academia and practice is crucial. The results from 'Research through practice' should not be kept as a closed information but readily shared with the architecture community. This approach is required to bringing the ideas from niche to mainstream.

The roles of architecture can be best realized by the close interaction amongst the spheres working with the same ideology towards a collective goal.

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